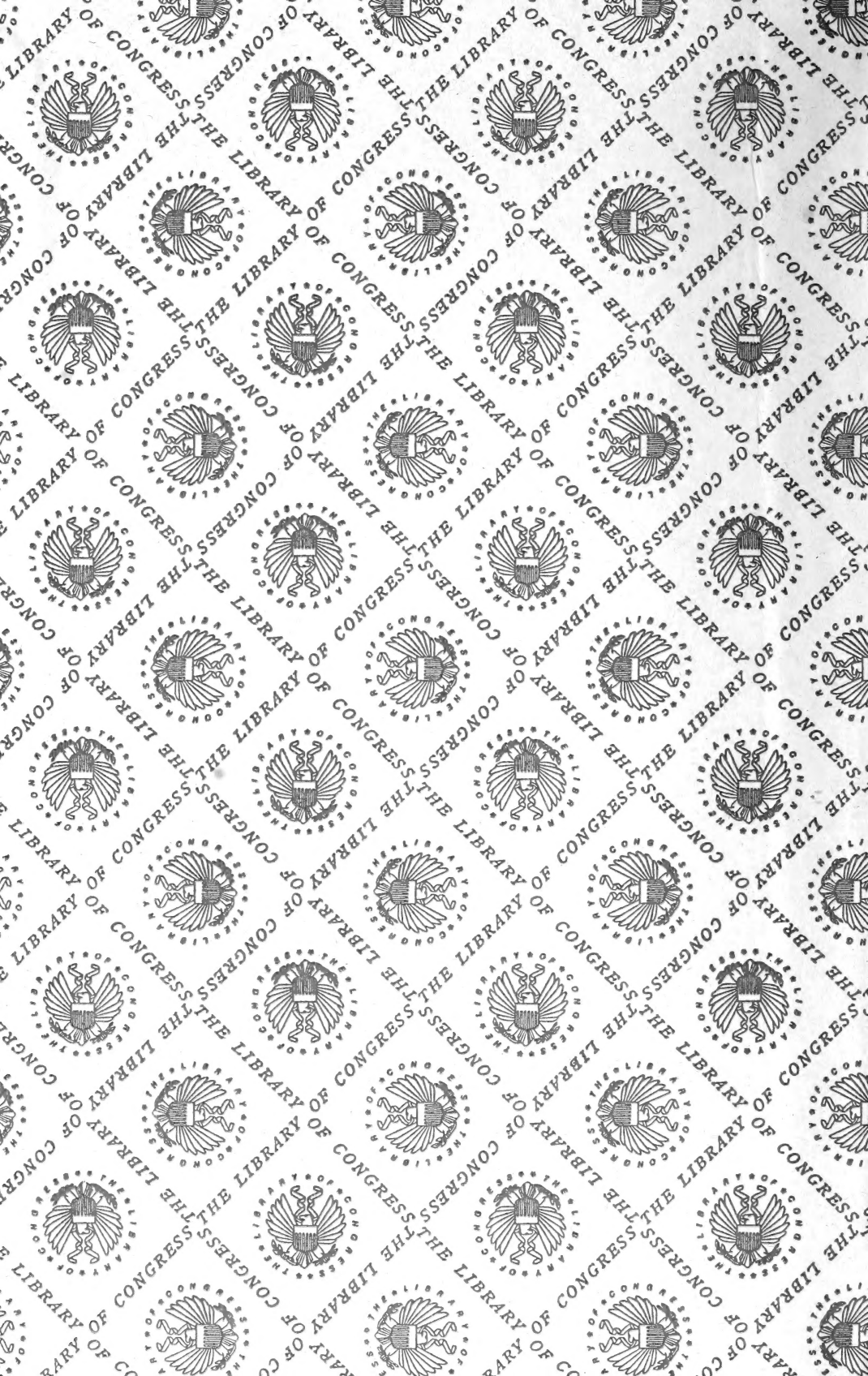
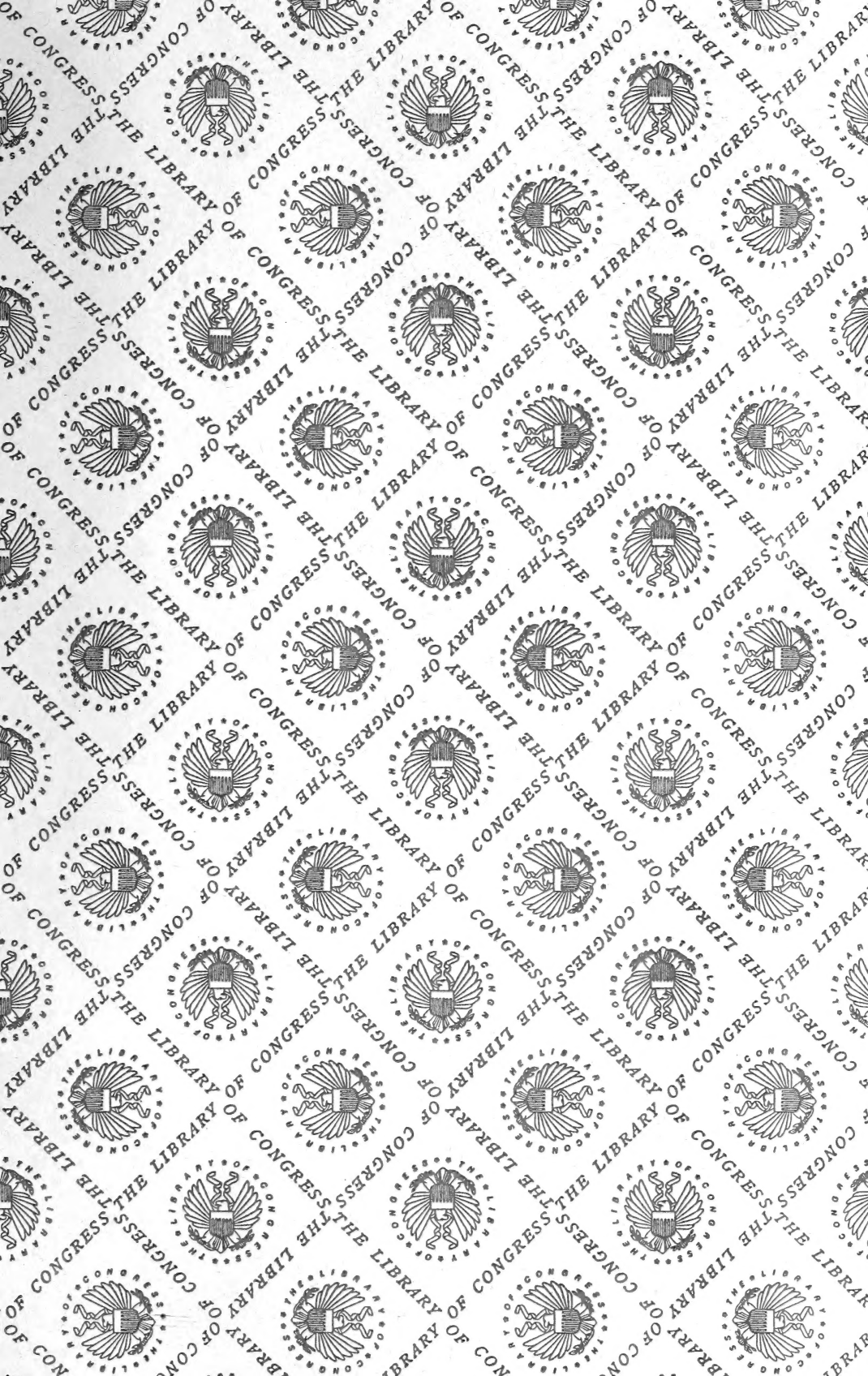


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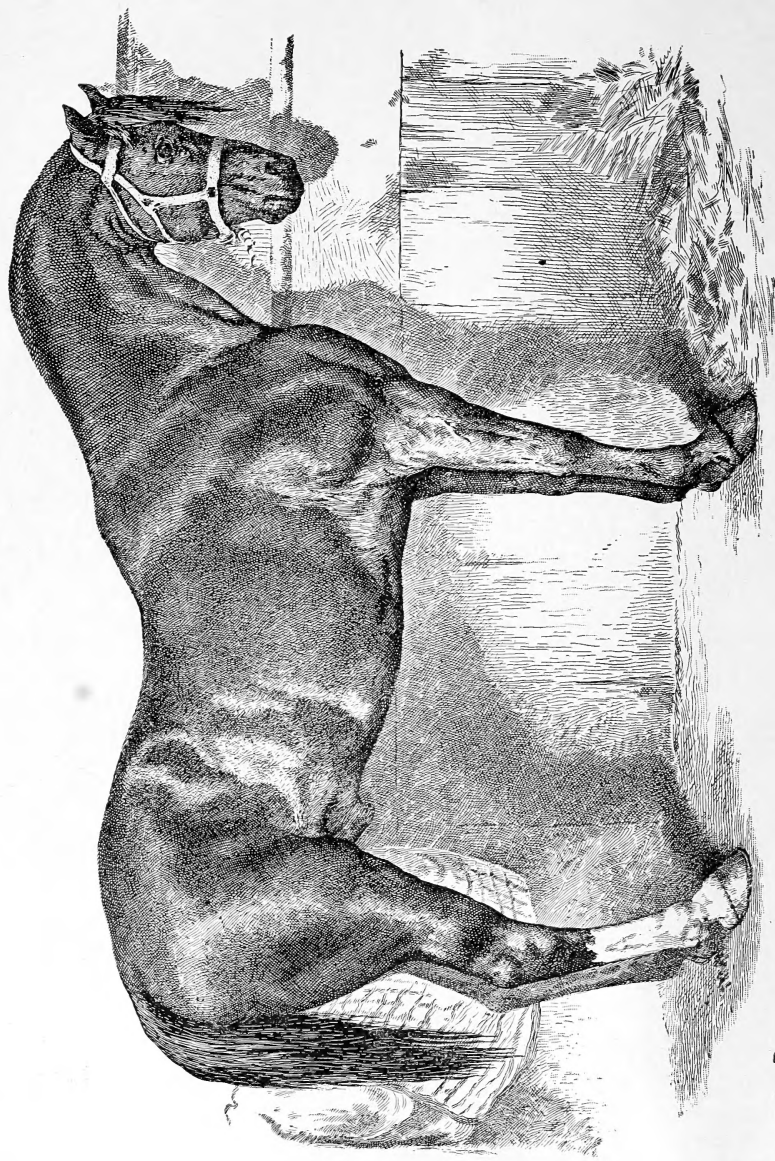
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AFTER ROSA BONHEUR.

A TYPICAL HORSE, FROM A PAINTING BY THE WORLD'S GREATEST ANIMAL PAINTER.

HAND-BOOK
OF
READY REFERENCE.

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PREFACE.

THIS work has been prepared to meet the requirements of the busy men of our country, who have felt the need of a reliable systematic work which would aid them to properly care for their domestic animals in health and sickness and give them practical and valuable knowledge on other general subjects in a condensed form ready for reference or use. They have looked in vain for a simple and authentic treatise on the causes, symptoms, prevention, and cure of the diseases with which their domestic animals are so often afflicted. The works now on the market are for the use of practitioners of medicine or are merely compilations by unscientific and unprofessional writers, whose works are misleading and dangerous. Most of the diseases can be easily detected and properly treated by the intelligent farmer and stock-owner, and it is the aim of this work to assist them in their study and aid them in fully understanding the principle of the application of the various remedies and their effects.

In order to prepare a work practical in all its details, much time has been spent conferring with the intelligent farmers and stock-raisers, in the various parts of our country, regarding the contents of a work to meet their approval. Every suggestion has been faithfully carried out and we hope that our work will meet with the hearty approval of the American public. This experience and observation among the practical and experienced stock men leads to the belief that a practical work of this kind will be a great benefit to every owner of domestic animals.

Most of the special features of this work are the result of the recommendations of successful farmers and stock-raisers. To them we feel thankful for their generous aid.

Care has been taken to have the language so simple as to be readily

understood by even the humblest reader. Scientific words are explained, and the directions have been carefully and simply worded. The remedies are as far as possible those that can be easily procured, prepared, and administered. In a work of this kind it has sometimes been necessary to use unfamiliar words, and phrases, so in order that all may be thoroughly understood, a glossary has been prepared in which the words not familiar in every day life have been thoroughly explained.

In the veterinary department will be found the CAUSES producing the diseases, so that knowing the cause the disease may be avoided. That, "An ounce of prevention is worth a pound of cure," has been kept in mind throughout the book. Great care has been taken to accurately explain THE SYMPTOMS so that the disease may be properly located, and therefore know WHAT TO DO.

Acting upon the belief that no one man, nor any half-dozen men know all there is worth knowing on a subject so extensive, we have freely drawn from such able authors and practitioners as Drs. Law, Salmon, Trumbour, Liautard, Kneidecker, and Dickson, whose ability and standing in their profession and their specialities cannot be doubted.

Special charts or MANIKINS OF THE BODY OF THE HORSE AND COW have been prepared, also one of the KNEE, FETLOCK, ANKLE AND FOOT. By the study of these MANIKINS, which have never before been given to the public, an accurate knowledge of the construction of the bodies of the various animals, the location of the various organs and their functions can be accurately learned. A thorough study, and thereby an accurate knowledge of the construction, location, and uses of the various parts of the body will aid very much the ability to quickly judge the various diseases.

In conclusion, let us hope that those who attentively study these pages and accurately follow out the suggestions and directions hereby given, may by their increased success, profit, and pleasure, feel warranted in giving the work their fullest endorsement. If this proves to be the case the labor has not been in vain.

THE EDITOR.

EXPLANATORY KEY

—TO—

MANIKIN OF THE HORSE.

POINTS OF THE HORSE.

1. Ears.
2. Upper Lip.
3. Forehead.
4. Face.
5. Zygomatic ridge.
6. Nostril.
7. Hollow above the eye.
8. Maxillary joint.
9. Forelock.
10. Nape of neck or poll.
11. Crest or mane.
12. Throat.
13. Withers.
14. Back.
15. Loins.
16. Side of chest.
17. Breast.
18. Floor of chest.
19. Abdomen.
20. Flanks.
21. Prepuce or Sheath.
22. Shoulder.
23. Point of shoulder.
24. Arm.
25. Elbow.
26. Fore-arm.
27. Knee.
28. Cannon-bone or shank.
29. Fetlock-joint.
30. Pastern.

31. Coronet.
32. Heel.
33. Hoof.
34. Chestnut.
35. Haunch.
36. Croup.
37. Hip-joint.
38. Upper thigh.
39. Stifle.
40. Lower thigh.
41. Hock.
42. Chestnut.
43. Root of the tail.
44. Hair of the tail.

THE MUSCLES.

1. Transverse muscle of nose.
2. Zygomatic.
3. Spinctor muscle of nose.
4. Elevator of upper lip.
5. Wing of nostril.
6. Muscle of eyelids.
7. Masticator muscle.
8. Depressor muscle.
- 9—10. Temporalis muscle.
11. Splenius.
12. Trapezium.
13. Serratus magnus.
14. Levator humeri.
15. Sterno-maxillaris.
16. Latissimus dorsi.

- | | |
|-------------------------------------|---|
| 17. Antea spinatus. | 5. Left sub-clavian artery. |
| 18. Postea spinatus. | 8. Superior cervical artery. |
| 19. Teres externus. | 9. Vertebral artery. |
| 20. Triceps extensor brachii. | 10. Carotid artery, beginning of |
| 21. Latissimus dorsi. | 11. Thoracic artery, internal. |
| 23. Intercostal muscles. | 12. Thoracic artery, external. |
| 23. Oblique abdominal external. | 13. Cervical artery, inferior. |
| 24. Coraco-brachialis. | 14. Carotid artery, right. |
| 25. Extensor metacarpi magnus. | 15. Jugular vein. |
| 26. Anterior extensor of phalanges. | 16. Carotid artery, bronchial branch. |
| 27. Extensor suffraginis. | 17. Thyro-laryngeal artery. |
| 28. Anterior extensor of phalanges. | 18. Branches to larynx. |
| 29. External flexor of metacarpus. | 19. Branches to esophagus. |
| 30. Extensor of phalanges. | 20. Auricular. |
| 31. Extensor suffraginis. | 21. Occipital. |
| 32. Flexor perforatus. | 22. Retrograde. |
| 33. Flexor perforans. | 24. External maxillary. |
| 34. Suspensory ligament of fetlock. | 25. Maxillary artery, lower lip. |
| 35. Internal flexor of metacarpus. | 26. Maxillary artery, upper lip. |
| 36. Ligament. | 27. Artery of nose. |
| 37. Rectus abdominis. | 28. Artery of face. |
| 38. Gluteus maximus. | 29. Artery of angle of the eye. |
| 39. Superficials. | 30. Temporal artery. |
| 40. Muscle of fascia lata. | 31. Auricular artery. |
| 41. Biceps abductor femores. | 32. Axillary artery, muscular artery |
| 42. Semitendinosus. | 33. Axillary artery collateral of elbow |
| 43. Semimembranosus. | 34. Epicondylod. |
| 44.—45. Biceps abductor femores. | 35. Anterior radial artery. |
| 46. Oblique flexor of phalanges. | 36. Posterior radial artery. |
| 47. Gastrocnemus. | 37. Interosseous, or trunk artery. |
| 48. Perforatus, superficial. | 38. Digital artery. |
| 49. Flexor of perforatus. | 39. Radio-palmar. |
| 50. Perforatus, deep. | 40. Latent artery of foot. |
| 51. Lateral extensor of phalanges. | 41. Perpendicular artery of foot. |
| 52. Anterior extensor of phalanges. | 42. Anterior artery, coronary cushion |
| 53. Flexor of metatarsus. | 43. Posterior " " " |
| 54. Tendon Achilles. | 44. Circumflex artery of coronary. |
| 55. Oblique flexor of phalanges. | 45. Preplantar artery. |
| 56. Muscles draw tail downward. | 46. Plantar ungual artery. |
| | 47. Semilunar anastomosis. |
| | 48. Intercostal arteries, fourteen pair |
| | 49. Bronchial arteries to lungs. |
| | 50. Esophageal. |
| | 51. Diaphragmatic. |
| | 52. Lumbar arteries. |
| | 53. Abdominal arteries. |

CIRCULATORY SYSTEM.

1. Main artery or aorta.
2. Aorta, anterior portion.
3. Aorta, posterior portion.
4. Left coronary artery.

54. Ilio cæcal.
55. Gastric artery.
56. Splenic artery.
57. Mesenteric, anterior.
58. Arteries of small intestines.
63. Branches to small intestines.
64. Anterior branch of posterior mesenteric.
65. Posterior branch of posterior mesenteric.
66. Arteries of the kidneys.
67. Artery of posterior bowels.
68. Branch of posterior mesenteric.
69. Spermatic artery.
70. Iliac artery.
71. Pelvic artery.
72. Coccygeal, inferior.
73. Caudal arteries.
74. Gluteal arteries.
75. Ilio-lumbar artery.
76. Pudic, external artery.
77. Obturator.
78. Pudic, internal artery.
79. Abdominal aorta, terminal portion
80. Iliac artery, external.
81. Testicular small, (in females uterine anterior).
82. Pudic external, (in females mammary uterine artery).
83. Abdominal, posterior.
84. Femoral or crural.
85. Femoris profunda artery.
86. Saphena artery.
87. Popliteal artery.
88. Tibial artery, anterior.
89. Tibial artery, posterior.
90. Tibial recurrent artery.
91. Plantar artery.
92. Pedal artery.
93. Digital arteries.
94. Pulmonary artery.
95. Vena cava, anterior.
96. Jugular vein.
97. Dorsal vein.
98. Vena azygos.
99. Esophageal.

100. Bronchia.
101. Vena cava, posterior.
102. Iliac veins.
103. Hepatic veins.
104. Portal vein circulation.
105. Portal vein.
106. Circulation of hoof.

THE BONES.

1. 1 Prime to 18 prime, ribs.
1. Upper jaw bone.
2. Lower maxillary.
3. Occipital.
4. Parietal.
5. Frontal.
6. Upper tusk found only in males.
7. Superior maxillary.
8. Upper molars.
11. Nasal bone.
12. Lachrymal.
13. Lower tusk.
14. Zygomatic.
15. Lower molars.
18. Atlas.
- 18—24. Cervical vertebræ.
- 25—43. Dorsal vertebræ.
48. Lumbar.
- 49—54. Zacrurum.
- 54—73. Coccygeal vertebræ.
74. Sternum.
76. Illium.
77. Os magnum.
78. Elbow joint.
79. Elbow joint.
80. Radius.
81. Trapezium.
82. Cuneiform bone.
83. Lunar bone.
84. Os magnum.
85. Unceiform.
86. Metatarsal.
88. Sesamoid.
89. Os suffraginis.
90. Os Corono.
91. Coffin bone or Os pedis.

95. Pubis.
96. Femurs.
97. Scaphoid bone.
98. Tibula
99. Tibia.
100. Calcis.
102. Large scaphoid bone.
103. Small scaphoid bone.
104. Cuneiform.
105. Joint of the shoulder.
106. Metatarsal.
107. Sesamoid bone.
108. Os suffraginis or large pastern.
109. Os corona or small pastern.
110. Coffin bone or Os pedis.

DIGESTIVE ORGANS.

1. Cerebrum.
2. Cerebellum.
3. Medulla oblongata.
4. Spinal cord.
5. Section of cervical vertebræ.
6. Section of dorsal vertebræ.
7. Section of sacral vertebræ.
8. Coccygeal vertebræ.
9. Ligamentum nuchæ.
10. Turbinated bones.
11. Pharynx.
12. Entrance to larynx.
13. Thyroid gland.
14. Bronchi and their division.
15. Front lobe of lung.
16. Palate with ridges.
17. Molars.
18. Tongue.
19. Thoracic cavity.
20. Tendinous portion of diaphragm.
21. Muscular portion of diaphragm.
22. Left ventricle.
23. Right ventricle.
24. Pulmonary artery.
25. Common aorta.
26. Right auricle.
27. Right ventricle, interior.
28. Left auricle, interior.
29. Tendinæ chordæ of tricuspid valves
30. Left auriculo-ventricular valves.
31. Right auriculo-ventricular valves.
32. Tendinæ chordæ of auriculo-ventricular valves.
33. Opening of pulmonary vein into left auricle.
35. Biliary duct.
36. Hepatic vein.
37. Posterior vena cava.
38. Duodenum.
39. Ileum.
40. Lower portion of colon.
41. Upper portion of colon.
42. Pelvic portion of colon.
43. Upper portion of colon.
44. Pelvic portion of colon.
45. Pelvic portion of rectum.
46. Anus.
47. Left ureter.
48. Right ureter.
49. Scrotum.
50. Spermatic cord.
51. Location of penis.
52. Location of vagina.
53. Abdominal cavity.
54. Pelvic cavity.
53. On flap. Vagina.
54. Young in position before birth.
55. Unbilical cord.
56. Walls of uterus.
57. Chorion.

MANIKIN OF THE HORSE

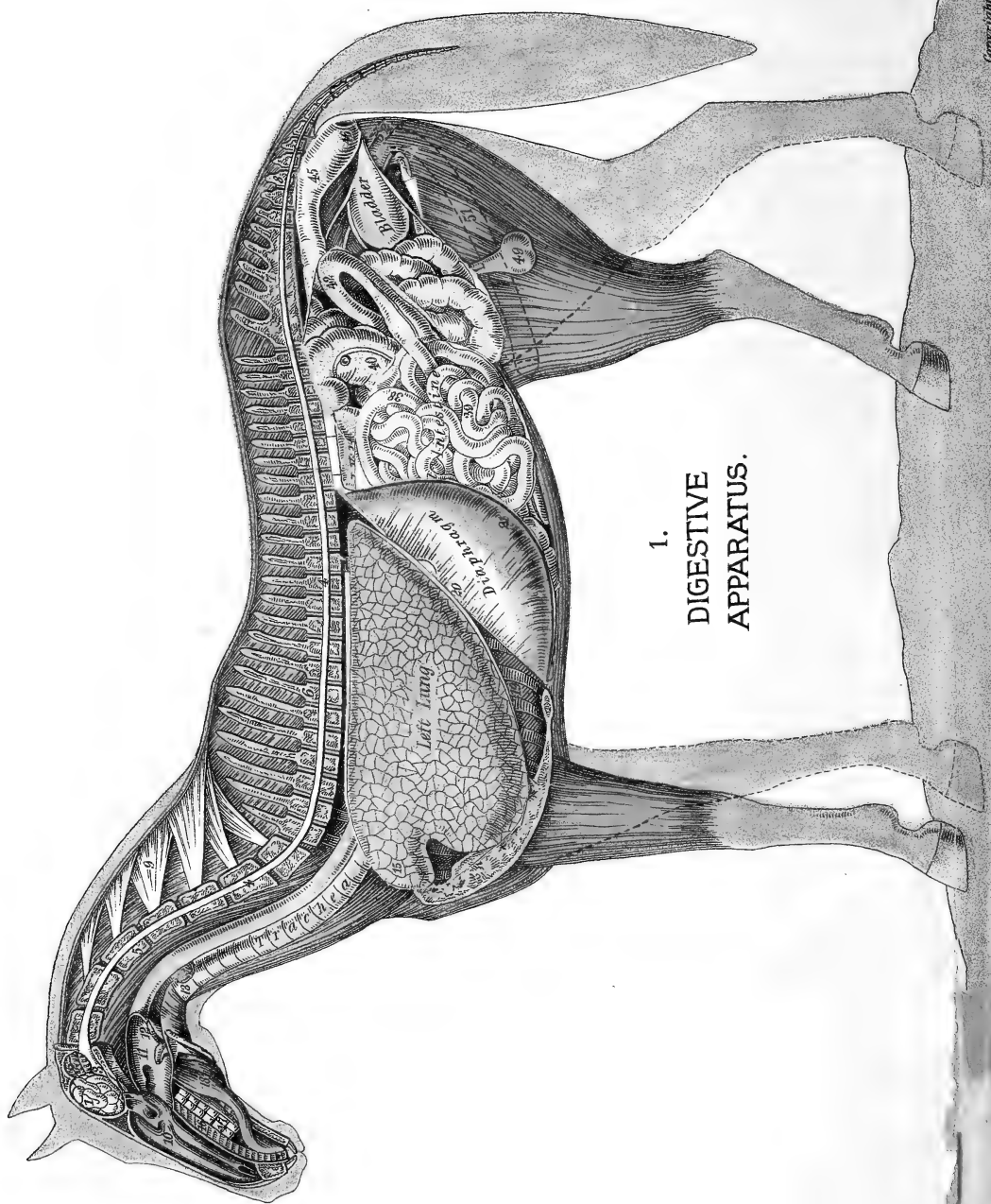
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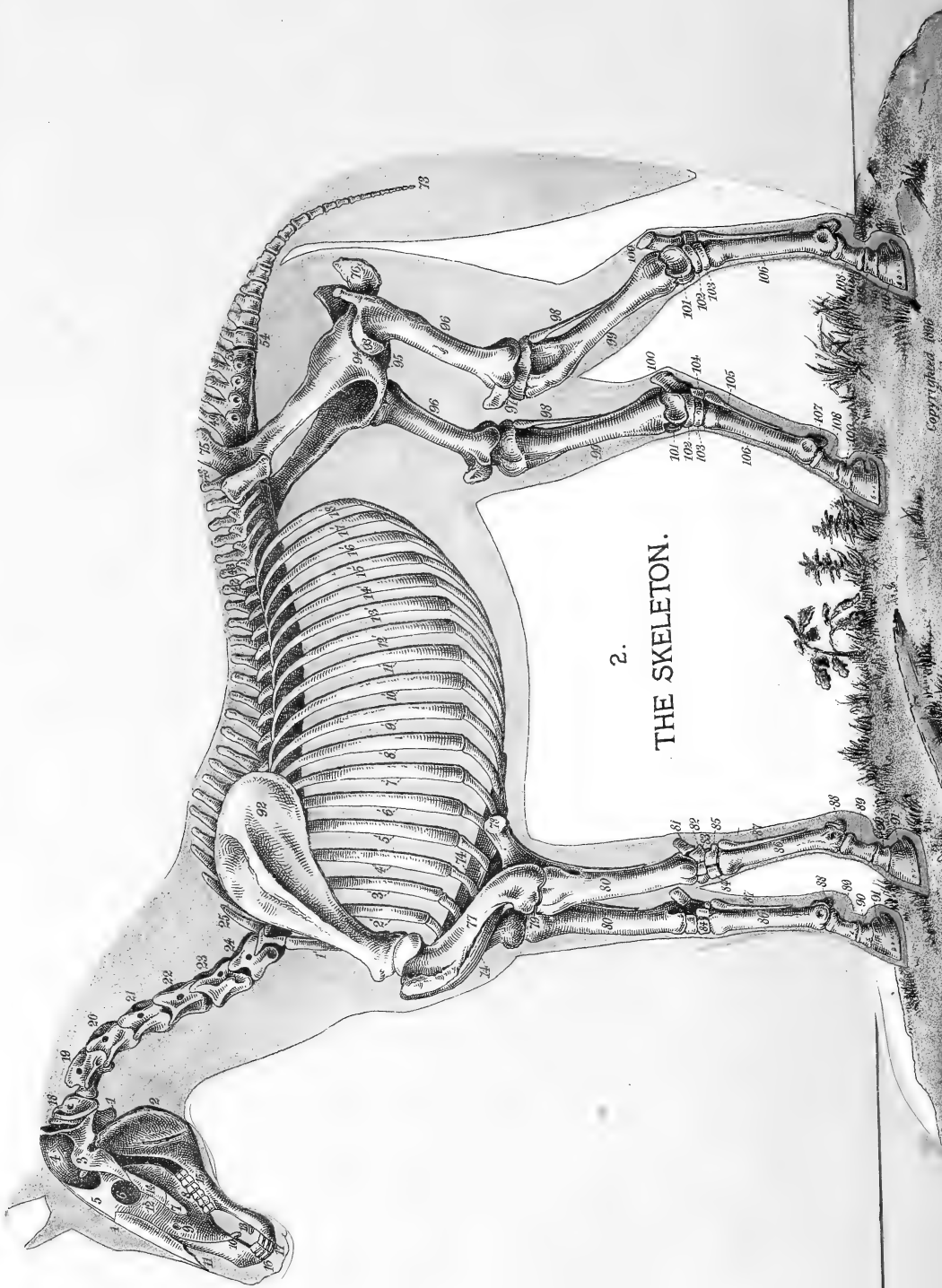
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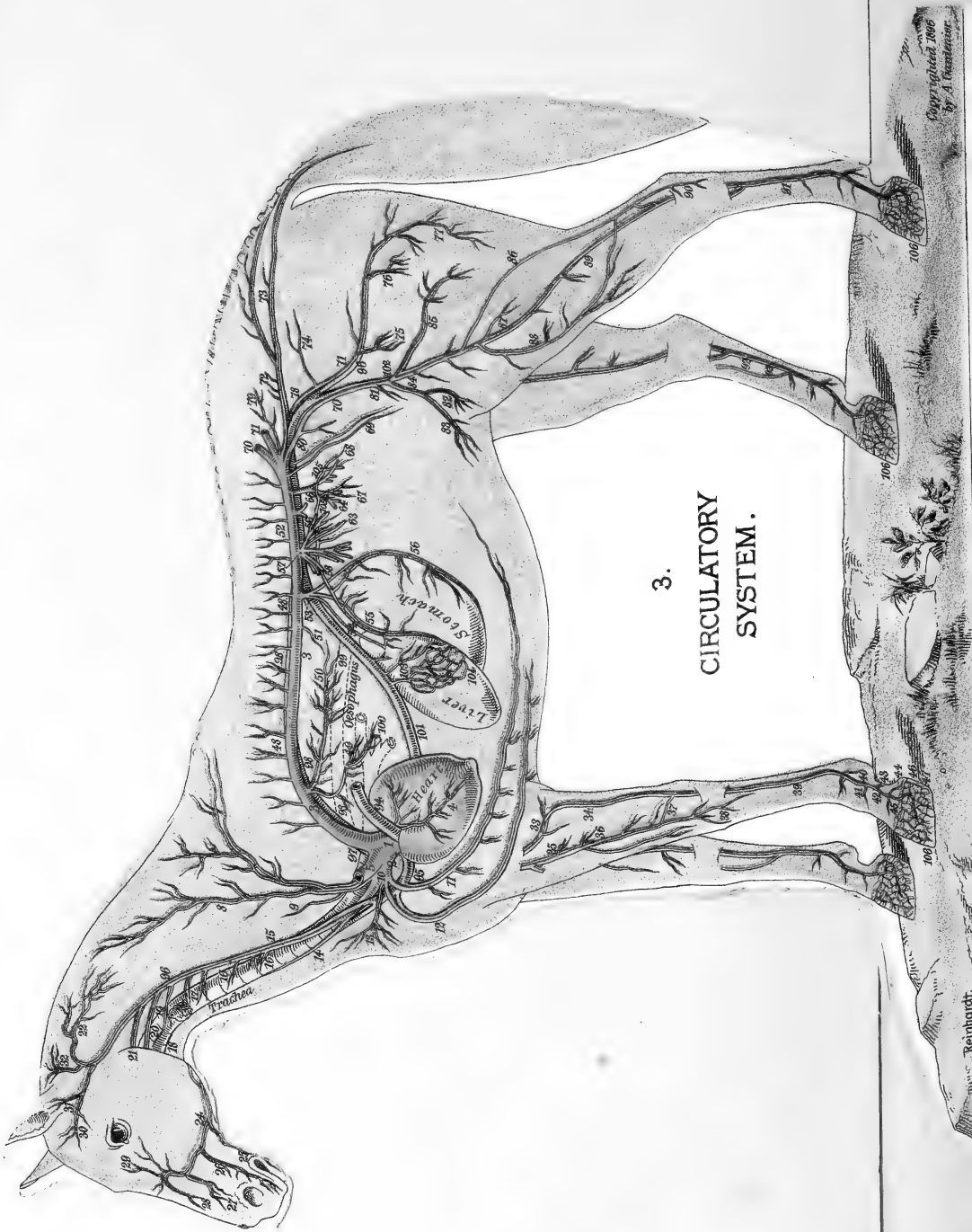




2.
THE SKELETON.

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3.
CIRCULATORY
SYSTEM.





4.
OUTSIDE LAYER
OF MUSCLES.

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Remond



THE HORSE.

CHAPTER I.

Management and Care in Sickness.

INTELLIGENCE REQUIRED, OUR DOMESTIC ANIMALS, FIRST REQUISITES, BOX STALL, GOOD BED, CLOTHING, REMOVE SHOES, FOOD, BRAN MASH, LINSEED MASH, BREAD MASH, FRESH WATER IMPORTANT, HAND RUBBING, COLD WATER BATHING OF THE LEGS, STEAMING, HOW TO MAKE POULTICES, BLISTERS, ANTISEPTICS, DEODORIZERS, HOT WATER BATHING, SLINGS, BANDAGES, RAREY'S SYSTEM OF THROWING OR CASTING, HOW TO GIVE MEDICINE, ELECTUARIES, INJECTIONS, GIVING A BALL, MAKING A BALL, GIVING LIQUIDS, GENERAL ADVICE.

A KEEPER of animals in a menagerie is required to study the habits of the animals and the conditions under which they live and thrive in their native wilds, before he is allowed to have full control of their feeding and care. These conditions must be duplicated as far as practical. The Polar bear must be supplied with ice, and food as nearly like that which he would feed upon, if he should be returned to his native land, as possible. But how many of our stock owners place the care of valuable animals in the hands of the entirely ignorant. It requires an intelligence far superior to that which is usually found in our ordinary stable-hand, to properly care for our domestic animals.

Our Domestic Animals have for so many generations been under conditions entirely contrary to their nature, that even they have changed somewhat in their habits and requirements. Our climate is far different from that in which they are found in their native state. The use to which man has put the noble horse is to blame for most of his diseases. In his native state the diseases which we find so troublesome are entirely unknown. The sooner sickness is recognized and the proper remedies used, the sooner the animal will be restored to health. But to

recognize disease it is obviously necessary to know the animal when well. If nothing is known regarding the natural pulse, how can one expect to know whether the heart beats regularly and natural or not. Study the condition of the animal in health as to pulse, number of respirations, color and quantity of the excretions, and remember if these change there has come a time to be specially observant of the actions of the animal, so as to determine the cause. Should these changes be the result of disease, determine its nature and be governed accordingly. A quick recognition of an ailment and promptness in treatment will the sooner restore health and less will be the liability of death and loss.

First Requisites. Provide the animal with plenty of pure, fresh air, always avoiding draughts. Make the stall as comfortable as possible; cool in summer and warm in winter. Keep the temperature as nearly 55° to 60° as possible. See that the drainage is good, and the place dry.

Box Stall. A box stall not less than ten feet square is best, and should be provided with a low half-door over which the animal may droop his head if so inclined. Windows in the stall should be darkened when animals have nervous diseases or eye troubles.

Good Bed. Provide plenty of fresh, clean straw or saw-dust. Some practical men prefer to have a bed made of old straw, which has been carefully collected and dried. The reason for this is, that it makes a softer and yet a more compact bed, and there are no stiff ends of new straw to annoy and irritate the sick animal.

Clothing. Woolen blankets in winter and linen sheets in summer should always be used. Have them loosely fastened on, if a surcingle is used, do not have it tight. Air the clothing everyday, but cover the animal with some other clothing during the airing.

Remove Shoes. If a horse is liable to be sick for any length of time, or is seriously ill remove all the shoes as it will be much more comfortable for the animal.

Food. Care and skill are needed in preparing the food, regulating the diet, and tempting the appetite of the sick. The food should be simple, nutritious, and easy of digestion. Change food often and give it in small quantities frequently. Food is rendered more easily digestible by being cooked. Give some green food whenever it can be procured. Scald all grains such as corn, oats, barley, bran and middlings, by pouring on boiling water. Then cover and allow to steam till cold, then feed. It is always best to have the grain ground, it being more easily digested.

Mashes. What are commonly known as MASHES are very useful in feeding sick horses and cattle, but they should be fed in small quantities and carefully prepared. Feed a mash from the tub in which it is mixed, because if placed in the manger the part remaining behind often sours, and renders all that is put in the manger thereafter unfit to be used.

Bran Mash. Mix two quarts of bran with enough boiling water to cover, add salt, stir thoroughly and allow to cool.

Linseed Mash. Boil a half pound of unground flaxseed in two quarts of water until it is reduced to about three pints. Pour this over bran instead of water and mix.

Bread Mash. Soak a loaf of bread, broken into pieces, in fresh milk until it is soft and can be made fine; stir and mix.

Fresh Water. Water should always be within reach of the animal, especially if there is any fever. A small quantity of powdered alum added to a pint of water will purify it by precipitating the impurities. Some animals seem to be given to scouring, to such, water should be given in small quantities, and frequent; or what is a better plan leave water always before such animals. Animals watered at intervals drink much more than when always supplied. A smaller quantity of water taken into the system lessens the secretions of the internal organs and decreases the tendency to scour.

Hand-Rubbing. Rubbing the legs is very useful to relieve any fullness caused by overwork or strain, or the lack of exercise. The friction excites the blood-vessels and absorbents to greater action. Gentle hand rubbing of the skin and sponging of the nostrils with weak vinegar and water is many times very refreshing to the sick.

Cleanliness. A stall that has been occupied by a sick animal should be thoroughly cleaned, washed with a hot antiseptic solution, and whitewashed before another animal is allowed to occupy it. The sheath should always be carefully cleaned at the beginning of any serious sickness, and occasionally thereafter if the trouble lasts any length of time.

Cold Water Bathing of the Legs. Cold water bathing is of much benefit in many cases. The cold reduces inflammation and tends to brace up weakened structures. After each cold bath the parts should be dried and bandaged. Cold applications should not be repeated oftener than three times a day.

Steaming. Take a clean grain bag not too large around at the

opening and fasten two strings, one on each side near the top, so that it can be fastened to the animal's head after its nose is placed in the bag. In the bottom of the bag make some holes, fill the bag partly full of clean hay. Upon this pour some boiling water, and as soon as the hay is saturated put the animal's nose in the bag and fasten in place over the animal's head. As soon as the steam stops rising, more boiling water should be added till the steaming has lasted an hour.

Poultices. While these can be easily applied to man and easily fastened in place, it is much more difficult to do so in the case of the horse or cattle. A poultice to be of any good must remain moist, and therefore it has to be made large and thick. Again the poultice must be fastened on, but care must be taken that it is not so tightly tied as to stop the circulation of the blood. Use a strip of cloth two or three inches wide to tie on the poultice instead of strings.

In order to prevent the substance from which the poultice is made, from sticking to the hair, they should be placed in a bag made of strong thin material. Another way is to spread the poultice on a thick piece of cloth and then cover the part to be placed to the skin with two thicknesses of mosquito netting. Various irritants, disinfectants, anodynes, etc., may be mixed with the poultice or spread upon the surface.

How to Make a Poultice. A poultice to be used simply for warmth is best made of bran mixed with hot water. One intended for softening or "bringing to a head" should be of equal parts of moist bran, flax-seed meal and olive oil. A very good one may be made of turnips or carrots mixed with bran. For a sore that does not seem to do well a flax-seed poultice is best. If the sore is painful, tincture of opium may be poured over the surface of the poultice. In inflammation of the foot, to soften the horn, saturate oakum with heavy crude petroleum and apply to sole and wall of the hoof.

Blisters. A mark or scar the result of a blister is needless, if the blister is properly applied and cared for after removal. The part to be blistered should have the hair closely clipped or shaved off. As soon as the blister has sufficiently drawn remove it, wash the sore and rub over the place some sweet oil. Be careful not to break or remove the loose skin, let it come off of itself. If the only purpose of the application is to produce simple irritation, remove the irritant as soon as sufficient redness appears and after washing apply the oil.

Antiseptics. In cases of wounds it is often the case to find that poisonous germs existing in the air are absorbed, and the wound does

not heal properly because of the germs producing putrefaction in the injured tissue. Blood-poisoning may follow the absorption of these microscopic organisms. Certain agents have the power of destroying these poisonous germs and are known as **ANTISEPTICS**.

How to Use Antiseptics. Some of the most valuable antiseptics are among the **DEADLIEST POISONS**, even in very small quantities. They should always be used, but with care. **CORROSIVE-SUBLIMATE** (bichloride of mercury) is the most valuable known. It is in the form of small white granules, and is very poisonous. It is used by dissolving three grains in a pint of hot water. This solution is used in washing and cleansing the wound. Carbolic acid, salicylic acid, blue vitriol, iodoform, sugar, and alum, are all among the antiseptics.

Disinfectants are agents which have the power of destroying or neutralizing infectious matter which is the product arising from an animal having a contagious disease, and a variety of other sources, as sewers, cess-pools, decaying matter, etc. Disinfectants are used in solid forms or in solution.

A Few Disinfectants. Fresh air and cleanliness are the first. To aid these we have:

BRIMSTONE (roll sulphur) for fumigation;

COPPERAS, (sulphate of iron) one and one half pounds dissolved in a gallon of water, to be used in cess-pools, sewers, and to be thrown over any infected matter;

COMMON SALT and **SULPHATE OF ZINC**, four ounces of each to a gallon of water, is valuable to wash all blankets that have been used on a sick animal;

CORROSIVE-SUBLIMATE, sixteen grains to a quart of water, is used to mix with the nasal discharges in case of glanders. The amount should equal the amount of discharge.

Deodorizers. There are very offensive odors around many a stable and out-house. There are substances which are capable of destroying or masking these odors and are known as deodorizers. They may or may not have the power of destroying contagious matter. The simple deodorizers are chloride of zinc and chloride of lime.

Hot Water Bathing. To be useful, hot water applications should be continued for two hours at a time. The water not warmer than 105° or hardly as hot as the hand will bear. Do not let the water get cool, but keep up the temperature by adding hot water. The water should not be applied directly to the part affected but applied by a swab or

sponge a little above the affected parts. After the parts are sufficiently bathed, cover them with cloths, woolen being by far the best. If you have not the time to bathe properly with hot water, wrap the parts in flannel and wet with hot water. Then be sure to cover well with thick woolen covering over which put rubber cloth to retain the heat. Some pieces of an old rubber coat or gossamer will be found useful.

Slings. Occasionally it is necessary to put an animal in a sling. The animal seems to dread to lie down, and remains standing until almost exhausted, which retards the cure. To prepare a sling therefore is sometimes necessary. Take sail-cloth or some other very strong cloth, a piece long enough to reach around the body of the animal, and wide enough to reach from the front legs to the back of the sheath. Prepare two stout sticks two feet longer than the cloth is wide and have them round. About the sticks wind the cloth, one stick at each end and with the cloth, wound around twice; nail very strong; to each stick fasten a strong rope. This rope should be fastened to each end of the stick which extends beyond the cloth. Now fasten to each rope the block and tackle which have previously been fastened to stout floor timbers overhead and then attaching the same the animal may be raised high enough to REST. Never allow a horse to hang in slings, because pressure on the chest walls will cause suffocation.

Bandages. To hold poultices and blisters in place bandages are often necessary. They are not easily held in position but with a small amount of ordinary calculation and plenty of bandages a poultice or blister can be held in any position on the animal.

Rarey's System of Throwing or Casting. Occasionally a horse having never been treated to any unusual handling, is very difficult to manage. Medicines have to be given and operations performed making it often necessary to resort to throwing or casting the horse. The directions given by the veteran horse trainer Rarey have never been improved upon so we give them in full.

"Everything that we want to teach the horse must be commenced in such way as to give him an idea of what you want him to do, and then be repeated till he learns it perfectly. To make a horse lie down, bend his left fore-leg and slip a loop over it, so that he cannot get it down. Then put a surcingle around his body, and fasten one end to a long strap around the other foreleg just above the head. Place the other end under the surcingle, so as to keep the strap in the right direction; take a short hold of it with your right hand; stand on the left side of

the horse; grasp the bit in your left hand, pull steadily on your strap with the right; bear against his shoulder till you cause him to move. As soon as he lifts his weight, your pulling will raise the other foot, and he will have to come to his knees. Keep the strap tight in your hand, so that he cannot straighten his leg if he rises up. Hold him in his position, and turn his head toward you; bear against his side with your shoulder, not hard, but with a steady, equal pressure and in about ten minutes he will lie down. As soon as he lies down, he will be completely conquered and you can handle him as you please. Take off the straps and straighten out his legs; rub him lightly about the face and legs with your hand the way the hair lies; handle all his legs; and after he has lain ten or twenty minutes let him get up again. After resting him a short time, make him lie down as before. Repeat the operation three or four times, which will be sufficient for one lesson. Give him two lessons a day; and after you have given him four lessons, he will lie down by taking hold of one foot. As soon as he is broken to lie down in this way, tap him on the opposite leg with a stick when you take hold of his foot, and in a few days he will lie down from the mere motion of the stick.

In practicing the foregoing method upon a colt, he should be first accustomed to be handled, and taught to be lead easily. In approaching a spiteful or vicious horse, you had better make your advances with a half open door between you and him; gradually make his acquaintance and teach him that you do not care for his open mouth; but a regular biter must be gagged with a wooden bit made for the purpose, so large that he cannot close his mouth.

Of course there is no difficulty in handling the leg of a quiet horse or colt, and by constantly working from the neck down to the fetlock, you may do as you please. But many horses, and even colts, have a most dangerous trick of striking out with their fore-legs. There is no better protection against this than a cart wheel. The wheel may either be used loose, or the animal may be led to a cart loaded with hay, when the horse-tamer can work under the cart through one of the wheels, while the colt is nibbling the load.

Having, then, so far soothed a colt that he will permit you to take up his leg without resistance, take a strap, pass the tongue through the loop under the buckle so as to form a noose, slip it over the near fore-leg and draw it close up to the pastern-joint, and then with leg doubled upon itself, put strap around the leg and fasten the leg up. But

you must not be rash in lifting the leg, and employ but little force in doing so. It is better to wait until he lifts it willingly by the use of gentle means. Do not get out of temper if you have to make a dozen ineffectual attempts to raise it. The near fore-leg being securely strapped, and the horse, secured from biting, if necessary, with the wooden bit, you will then make him hop about, as before stated. This he will learn to do easily. The trainer must however, take care to keep behind his horse's shoulder and walk in a circle, or he will be likely to be struck by the animal's head or strapped up leg.

A horse can hop on three legs for two or three miles, if you give him his own time, and no plan has ever been tried that has been equal to this for curing a balky horse. After you have tired him out pretty well in this manner, you proceed to make him lie down, which process requires considerable patience and skill. For this purpose take a longer strap, and making a loop with it put it round the off fore-leg. With a very quiet horse this can be easily done; with a wild or vicious horse you may have to make him step into it; at any rate, when once the off-fore-leg is caught in the noose it must be drawn tight round the pastern-joint. Then put a stout glove on your right hand, pass the strap through the belly part of the surcingle, take a firm hold of it with your gloved right hand, standing close to the horse behind his shoulders, and with your left hand take hold of the near rein; by pulling the horse gently to the near side he will be almost sure to hop; if he will not, he must be led. The moment he lifts up his left off fore-foot, you must draw up the strap tightly and steadily. The horse will then go down on his knees, because if you held the strap tight he will not be able to stretch out his feet again. As soon as a horse recovers from his astonishment at being brought to his knees, he begins to resist; that is he rears up on his hind legs, and springs about in a manner that will some times alarm the trainer. During these struggles you must not try your strength against the horse's strength, but merely follow him about, holding the strap just tight enough to prevent him from putting out his fore-leg. As long as you keep CLOSE TO HIM, and BEHIND HIS SHOULDERS, you are in very little danger. The bridle in the left hand must be used like steering lines, by pulling to the right or left as occasion requires, the horse, turning on his hind legs, may be fatigued by being forced to walk backwards. The strap passing through the surcingle keeps, or ought to keep, the trainer in his right place; he is not to pull or in any way fatigue himself any more than he can help, but, standing upright,

simply follow the horse about, giding him with the bridle so he will not precipitate himself against the side of the stable or room in which you are exercising him. When held and guided properly, he will soon sink down. Corn-fed horses will hold out longer than grass-fed ones, and the most energetic horse will not struggle more than ten or fifteen minutes. Usually at the end of eight minutes violent struggling, the animal sinks forward on his knees, sweating profusely, with heaving flanks and shaking tail. If he resists, he may be forced by the bit to walk backwards and forwards, but this is generally unnecessary, as by pushing gently at his shoulder or by pulling steadily the off-rein, you can get him to fall, in the one case on the near side, in the other on the off-side; but this assistance should be so slight that the horse will not attempt to resist it. The horse will often make a final spring when you think he is quite beaten; but at length he slides over, and lies down, panting and exhausted, on his side. If he is a pretty spirited animal take advantage at the moment to tie up the off fore-leg to the surcingle, as securely as the other, in a slip-loop knot.

Now let your horse recover his wind, and then encourage him to make a second fight. It will often be more stubborn than the first. The object of this tying-up process is that he shall thoroughly exhaust without hurting himself, and that he shall come to the conclusion that it is you who, by your superior strength have conquered him, and that you are always able to conquer him.

Under the old rough riding system, the most vicious horses were occasionally conquered by daring men with firm seats and strong arms, who rode and flogged them into subjection; but these conquests were temporary, and usually personal; with every stranger the animal would begin his game again.

One advantage of this system is, that the horse is allowed to exhaust himself under circumstances that render it impossible for him to struggle long enough to do himself any harm. It has been suggested that a blood vessel would likely be broken or apoplexy produced by the exertion of leaping from the hind legs; but up to the present time no accident of any kind has been reported.

Treatment of the Horse After He is Down. If the horse has fought hard in going down, he will then lie perfectly still, and you can gentle him, scrape the sweat off, and rub him down, smoothing the hair of his legs, and drawing the fore one straight out. In this position you have the opportunity of making him perfectly familiar with you,

and the more you fondle him and reconcile him to you the better. His head, tail, and legs should now be handled with freedom, caressing and talking to him all the while. If he has hitherto resisted shoeing, handle all his legs with a view to accomplish it, and if he attempts to resist, continue till you subdue him, speaking to him with a voice of authority. If he is a bad kicker you may be obliged to confine his fore-legs; and with them tied, you may spend an hour in handling his legs, tapping the hoofs with your hammer—all this to be done in a firm, measured, soothing manner; only now and then if he resists, cry as you paralyze him with the ropes, Whoa, in a determined manner. It is by this continued soothing and handling that you establish confidence between you and the horse. After patting him as much as you deem needful, say for ten minutes or a quarter of an hour, you may encourage him to rise. Some horses will require a good deal of helping, and it may be necessary to draw out their fore-legs before them. The handling of colts in this condition, particularly requires caution. A colt tormented by flies will kick forward nearly up to the fore-legs. If a horse, unstrapped, attempts to rise, you may easily stop him by taking hold of a fore-leg and doubling it back to the strapped position. If by chance he should be too quick, don't resist, for it is an essential principle of this system never to enter into a contest with a horse unless you are certain to be victorious. In all these operations you must be calm, and never in a hurry, or in a passion."

HOW TO GIVE MEDICINE.

Electuaries. A medical compound of powders, or other ingredients, mixed with honey, or syrup, and made a little thicker than honey, is called an electuary. These are easily given by rubbing on the tongue or teeth, from which the animal at once licks them, and swallows them with the saliva.

When necessary to give only a very small quantity of medicine it may be dropped or poured upon the tongue.

Injections. Several instruments have been made with the false notion that it is best to force liquids into the intestines of the animal. Experience has shown that the best instrument to be used for this purpose is a Gamgee's funnel. It is a straight tin tube about a foot long, tapered and rounded off at the smaller end, bent at the opposite end at right angles. This end supports a funnel about a half dozen inches deep and as many across. Always thoroughly oil before using, and af-

ter entering the instrument pour the liquid into the funnel. The liquid from the funnel will by the force from its own weight gradually find its way into the rectum. Every owner of horses and cattle should provide himself with such an instrument. Of course in case such an instrument is not at hand, the old way may be resorted to, namely; the bladder tied to a hollow elder stick.

Giving a Ball. To one who has never given a ball, a few directions may not be amiss. The method described by Gamgee is easily learned by following his directions, as follows: First, "turn the animal from the manger with a halter on, held by an assistant. Attempting to give a ball to a horse tied up in a stall has before this proved a fatal experiment to the operator. Second; it is extremely dangerous to resort to twitching with awkward horses, as our power in keeping the mouth open depends on the moderate stretch on the tongue, which is not felt or cared for by a horse severely punished by a twitch on his ear. Third; stand on the off side of the horse's head, with a cloth in the left hand to wipe the mouth, should there be, as in some cases an excess of saliva to interfere with holding the tongue; the left hand is placed on the horse's crest, while the right is put into the angle of the mouth, the tongue is seized gently, wiped if necessary, grasped with the left hand and drawn downwards. Some compress the tongue against the left side of the lower jaw, bringing it between the molar (back) teeth on that side. Others drag the tongue out of the mouth, and hold it firmly. It is very important to hold it so that, in any movement the horse may take, there is a point of support for the hand against the lower jaw. Pulling on the tongue may give unnecessary pain, make a horse restless, and in tossing his head about, the tongue may be severely lacerated. Fourth; the ball, which has been ready all the time in the waistcoat pocket, or grasped by the lips of the operator, is seized, and avoiding unnecessary hustle and hurry, it is carried up the middle of the mouth and dropped on the back of the tongue; at the same instant the tongue is quietly let loose, and as the horse draws it back, the ball is held in the back part of the mouth, from which it cannot come except by a fit of coughing; as soon as the hands are withdrawn, the mouth is kept closed, and the left side of the neck watched to see the ball pass down the œsophagus; this may occur before looking round to the neck, so that, after waiting a little, if the ball is not seen the horse should be caused to drink a little water. It is well to always give a drink after giving a ball, as it is disagreeable to leave an animal,

and when your back is turned to have the ball coughed into the manger. In morbid conditions of the system, and in the unnatural manner in which the ball is given, the passages are not well moistened and lubricated, and it may be some time before the ball enters the stomach through the cardiac orifice."

Making a Ball. The old way of making a ball is to mix the ingredients with a little molasses, honey or syrup so as to form a stiff dough, adding if necessary, enough ground flax seed or bran to give it the required size, which is about that of a man's thumb. There are now to be had in nearly every drug-store gelatine capsules, which are much nicer in every way. Those having many horses to care for, would do well to keep a supply on hand.

Giving Liquids. In the absence of a drenching horn use a soda-bottle. The following rules if followed will be found to be practical. "First, hold the horse's head up at a moderate height, so that the line of the face is horizontal. Second, allow sufficient movements of lips, tongue, cheeks, and jaws, so as not to interfere with the first act of swallowing. To draw the tongue forcibly outward is very injurious, for if the tongue is stretched it does not aid in pressing back the fluid which gravitates as the tongue is pulled upon, and the larynx and pharynx advance, the animal may be choked. Third; if the animal makes an effort to cough, rather lose the draught than risk the danger of suffocation, which so readily occurs if fluid is suddenly thrown over the tongue. Fourth; entice efforts of swallowing should the horse obstinately hold the liquid in his mouth. This is done by rubbing the side of the neck, along the oesophagus.

Holding the Horse. The following from F. O. Kirby gives the best known methods: "The methods of holding horses during the giving of liquids are various, but the most important ones are three. In the first place, by ropes and pulleys a horse's head is pulled up from a beam or other high object in a stable or shed. This is very objectionable, especially in a vicious horse; and we have never found it to answer better than the method of introducing a rope-noose over the upper jaw. This noose is fastened to a stick, or slipped over a stable-fork prong, and a man can then hold up the head of the heaviest horse and follow him in his movements. It requires management. I do not like the fork, as it is a dangerous instrument, and prefer an ordinary twitch. In the third method the man holds the head up and gives the medicine. It is the most simple and useful method. It only requires one person, who

holds the tongue, places his thumb round the lower jaw, and with his fingers causes the horse to open his mouth whilst the draught is poured out of the horn or bottle with the right hand."

General Advice. Owners of stock should keep on hand some of the more common, and useful drugs so as to be ready for emergencies. He should also be provided with a few of the most useful surgical instruments. Do not wait till some animal is sick before studying the symptoms of the various diseases. As soon as you learn that an animal in the neighborhood is sick, go and look at it. It is not necessary for you to offer any advice in the matter, but by observation and reading you will soon be able to determine the disease as soon as seen. If you know the disease for a certainty and also the remedy, there is no reason why with careful nursing you cannot cure it, if capable of being cured, as well as any one. A veterinarian has to study and observe for three years before he is considered capable to recognize all the various diseases; so do not be discouraged, if you have to spend some time before you feel sure as to the trouble. Each effort will make you more confident and proficient. Study the pulse of the various animals and count the respirations. Remember it is only by careful study that you can succeed.



CHAPTER II.

Feeding and Care.

GENERAL REQUISITES, WATERING HORSES WHEN WARM, QUANTITY OF WATER REQUIRED, KINDS OF FOOD, DIGESTION OF TWO KINDS, FEED OATS AFTER HAY, COMMON ERROR, HORSE HAS A SMALL STOMACH, TEN POUNDS OF HAY A DAY, STRAW, CHAFF, GRAINS, WHEAT, RYE, BRAN, CORN, LINSEED, POTATOES, BEETS, CARROTS, GRASSES.

FEEDING and care of an animal have much to do with the its general health. Animals not at hard work and running in well watered pastures, are seldom ill, but horses confined in stables and fed and watered, and worked according to the notions of its caretaker, are very liable to diseases of various kinds. As much pains should be taken to feed, water, and care for the animal properly, in health as would be taken to cure it, if sick.

Watering Horses When Warm. There is a common notion among users of horses, that if a horse is warm he should not be allowed to drink, many claiming that the "first swallow" of water either "founders" the animal or produces colic. This is not true. It does not matter how much heated the horse may be, it is always safe to give him a half-dozen swallows of water. If this water is given just before being put in the stable, the animal should be immediately supplied with a few pounds of hay, and should not be fed grain until the animal has rested about an hour. The danger is not in the "first swallow" but is always due to the large quantity which the animal will take when warm, if allowed to drink without restraint. Over one-half of the digestive disorders are undoubtedly caused by improper feeding and watering, hence one can readily see the importance of a proper understanding of these subjects.

Quantity of Water Required. When horses can get water whenever they wish it, they never drink enough at one time to injure them.

Where the horse is dependent upon his attendant for water, he commonly requires about eight gallons a day. This will vary with the class of food, if green food is used a portion of this is supplied and a less quantity needed than when fed on dry hay and grain. The horse should be watered at least three times a day when idle and oftener when at work. Remember always to water before feeding.

Kinds of Food. Since the horse is fed in this country on hay, grass, oats, corn, wheat, rye, and roots one might conclude that the horse could not be fed on any other kind of food. The following from Loudon's Encyclopedia is of interest :

"In some barren countries horses are forced to live on dried fish, and even on vegetable molds ; in Arabia, on milk, flesh-balls, eggs, and broth. In India horses are variously fed. The native grasses are judged very nutritious. Few, perhaps no oats are grown ; barley is rare and not often fed to horses. In Bengal a plant, something like the tare, is used. On the western side of India a sort of pigeon-pea forms the ordinary food, with grass while in season, and hay all the year around. In the West Indies maize, guinea corn, sugar-corn-tops, and sometimes molasses, are given. In the Mahratta country salt, pepper, and other species are made into balls, with flour and butter, and these are supposed to produce a spirited animal and give it a fine coat. Broth made from sheep's head is sometimes given."

Digestions of Two Kinds. In the horse as well as in man digestion takes place in the stomach and intestines. The food after passing into the stomach undergoes a change before passing out to the small intestines where the process of digestion is finished. The change taking place in the stomach is called, stomach digestion, and that in the intestines, intestinal digestion.

Feed Oats After Hay and Straw. The time required for stomach digestion varies with the different foods. Hay and straw are digested and pass out of the stomach more rapidly than oats or other grain. If oats are fed first, and are followed by hay, the hay soon passing onward into the intestines will carry along with it oats that are not yet prepared for intestinal digestion thus causing a loss of food. Another reason for feeding hay first, (more particularly if the horse is very hungry or tired from over work) is that it takes more time to masticate the hay and the horse cannot bolt it down as it would grains. Water should not be given soon after feeding, as it washes the food from the stomach before it has had time for proper stomach digestion.

Common Error of Feeding. An error that produces many disorders of the digestive system, is TO FEED TOO SOON AFTER A HARD DAY'S WORK. A very small quantity of hay may be given but grain should not be fed within less than an hour.

Horse has a Small Stomach. An examination of the ANATOMICAL MANIKIN OF THE HORSE as found in the beginning of this book, shows that the horse has a very small stomach in proportion to his size. This proves to us that the horse should be fed in small quantities and often. The disproportion between the size of the stomach and the amount of water usually given at one time shows plainly that the horse should always be watered before feeding. Feed at least three times a day, and not wholly on concentrated food. Bulky food must be given to detain the food in its passage through the small intestines, so that it can be thoroughly digested and the nutriment absorbed.

Ten Pounds of Hay a Day. A horse that is fed twelve quarts of oats a day, or other grain in proportion, should be allowed ten to twelve pounds of good timothy hay a day. Do not keep horses that are at light work, entirely on hay, if you do they will soon become "pot-bellied," fall off in flesh, and will not thrive. Even colts unless fed with some grain, grow up long, lean, and gawky, and never make as good horses as those accustomed to grain.

Hay. The best hay for horses is timothy. Hay from six months to a year and a half old is best. It should be of a greenish color, crisp, clean and fresh. New hay is hard to digest, produces "slobbering" and sometimes diarrhea. Mow-burnt hay produces disorders of the kidneys and bowels. Musty or moldy hay has often been said to produce that peculiar disease variously known as cerebro-spinal-meningitis, putrid sore throat, or choking distemper.

Straw. The straws are not extensively fed in this country. and when used at all they should be cut and mixed with hay, and ground or crushed grains. Wheat, rye, and oat straw are the ones most used, and of these oat straw is the most easily digested and contains the most nourishment. Pea and bean straw are occasionally fed to horses, the pea being preferable according to most writers.

Chaff. Wheat and rye chaff should NEVER be used as a food for horses. The beards frequently become lodged in the mouth or throat and are productive of more or less serious trouble. In the stomach and intestines they often serve as the nucleus of the "soft concretions"

which are to be described when treating of obstructions of the digestive tract. Oat chaff, if fed in quantities and mixed with cut hay or corn-fodder, is very much relished by horses. It is not to be given in large quantities, as a troublesome and sometimes fatal diarrhea follows the practice of allowing horses or cattle free access to a pile of oat chaff.

Grains. Oats takes precedence of all grains as a food for horses, as the ingredients necessary for the complete nutrition of the body exist in them in the best proportions. Oats are besides more easily digested and a larger proportion absorbed and converted into the various tissues of the body. Care must be taken in selecting oats. According to Stewart the best oats are one year old, plump, short, hard, clean, bright, and sweet. New oats are indigestible. Kiln-dried oats are to be refused as a rule, for even though originally good this drying process injures them. Oats that have sprouted or fermented are injurious and should never be fed. Oats are to be given whole or crushed; whole in the majority of instances, crushed to old horses and those having defective teeth. Horses that bolt their food are best fed upon crushed oats and out of a manger large enough to permit of spreading the grain in a thin layer. The average horse requires, in addition to the allowance of hay above spoken of, about twelve quarts of good oats daily. The best oats are those cut about one week before being fully ripe. Not only is the grain richer at this time in nutritive materials, but there is also less waste from "scattering" than if left to become dead ripe. Moldy oats, like hay and straw, not only produce serious digestive disorders, but have been the undoubted cause of outbreaks of that dread disease in horses, characterized by inability to eat or drink, sudden paralysis, and death.

Wheat and Rye. These grains are not to be used as food for horses except in small quantities, bruised or crushed, and fed mixed with other grains or hay. If fed alone, in any considerable quantities, they are almost certain to produce digestive disorders, laminitis "founder," and similar troubles. They should never constitute more than one-fourth of the grain allowance, and should always be ground or crushed.

Bran. The bran of wheat is the one most used, and its value as a feeding stuff is variously estimated. It is not to be depended upon if given alone, but may be fed with other grains. It serves to keep the bowels open. Sour bran should not be given. It disorders the stomach and intestines and may even produce serious results.

Corn. This grain is not suitable as an exclusive food for young horses, as it is deficient in salts. It is fed whole or ground. Corn on the cob is commonly used as the food for horses affected with "lampas." If the corn is old and is to be fed in this manner it should be soaked in pure, clean water, for ten or twelve hours. Corn is better given ground, and fed in quantities of from one to two quarts at a meal mixed with crushed oats or wheat bran. We must be very particular in giving corn to a horse that is not accustomed to its use. It must be commenced in small quantities and very gradually increased. There is no grain more likely to produce acute indigestion than corn if these directions are not observed.

Linseed. Ground linseed is occasionally fed with other foods to keep the bowels open and to improve the condition of the skin. It is of particular service during convalescence, when the bowels are sluggish in their action. Linseed tea is very often given in irritable or inflamed conditions of the digestive organs.

Potatoes. These are used as an article of food for the horse in many sections. If fed raw and in large quantities they often produce indigestion. Their digestibility is favored by steaming or boiling. They possess, in common with other roots, slight laxative properties.

Beets. These are not much used as food for horses.

Carrots. These make a most excellent food, particularly during sickness. They improve the appetite and slightly increase the action of the bowels and kidneys. They possess also certain alterative properties. The coat becomes smooth and glossy when carrots are fed. Some veterinary writers claim that chronic cough can be cured by feeding carrots. Carrots may be considered as very beneficial if fed regularly in small quantities.

Grasses. The natural food of the horse is grass. There are many varieties and they vary much in value. Some are almost without value as food and are only eaten when there is nothing else obtainable, while others are positively injurious or even poisonous. None of the grasses are sufficient to keep the horse in condition for work. Horses thus fed are "soft," sweat easily, purge, and soon tire on the road or when at hard work. To growing stock grass is of great value, and there is no doubt that it acts as an alterative when given to horses that have been fed on hay and grain. To such it should be given in small quantities at first. If the horse is turned to grass for a time each year it gives the stomach and intestines a chance to undergo rest and recuperate.

CHAPTER III.

Drugs and Medicines, Their Doses and Effects.

TIME REQUIRED FOR DRUGS TO TAKE EFFECT, EXPLANATION OF THE EFFECT OF DRUGS, DOSES OF MEDICINE ACCORDING TO AGE, HOW OFTEN TO GIVE MEDICINE, TABLE OF DRUGS, THEIR DOSES, AND EXTERNAL AND INTERNAL ACTION.

MUCH attention and study should be given to the quantity of a drug or medicine that should be administered and how often the dose should be repeated. The effect that should be expected from the medicine and the time that should elapse before the result should be noticeable. One not having accurate knowledge is often through impatience tempted to repeat a dose before the medicine has had time to operate, and thus an overdose is the result, which is often more dangerous in its results, than the disease it is given to cure. To aid in the better understanding of the effects of drugs and of the table herein annexed which gives the action and doses of the various medicinal substances, the following explanation of the usual terms used, is given.

EXPLANATION OF THE EFFECT OF DRUGS.

Absorbent—that which takes up or absorbs.

Alterative—that which changes the conditions and functions of organs.

Anaesthetic—that which causes the loss of feeling or sensation.

Anodyne—that which soothes or diminishes pain.

Antacid—that which kills the effect of acids.

Anthelmintic—used to kill or expel worms.

Antiperiodic—stops or holds back the return of spasms in periodic diseases.

Antiseptics—stop or hold back the decay of tissues.

Antispasmodic—that which prevents or lessens cramps.

Aperient—used to gently open the bowels.

Aromatic—a strong smelling stimulant used to dispel wind and allay pain.

Astringent—that which causes contraction.

Carminative—a warming stimulant.

Cathartic—used to freely open the bowels.

Caustic—that which will destroy tissues.

Cholagogue—causes an increase in the secretion of bile.

Demulcent—a soothing substance which protects irritated surfaces.

Deturgent—a substance which cleanses the skin.

Diaphoretic—a remedy which increases the secretion of sweat.

Discutient—a local application which removes the congestion of inflamed parts, and the skin covering them.

Disinfectant—that which destroys contagious matter.

Diuretic—increases the secretion of urine.

Ecbolic—that which causes contraction of the womb.

Emetic—that which induces vomiting.

Emollient—a substance which softens and relaxes the parts to which they are applied.

Excitant—a stimulant when applied locally.

Expectorant—that which aids in removing the secretions from the air-passages.

Febrifuge—lessens fevers and lowers temperature.

Laxative—a mild physic.

Narcotic—produces sleep and allays pain.

Refrigerant—that which diminishes heat.

Sedative—that which exerts a soothing effect upon the system.

Soperific—another name for a narcotic.

Stimulant—that which temporarily excites the nervous system or the circulation.

Sialogogues—that which increases the secretion of saliva.

Stomachic—an improver of digestion.

Tonic—that which improves digestion and nutrition.

Vermifuge—a substance used to kill and expel worms.

A reference to the above explanation will readily explain the effects of the drugs as given in the table.

DOSES OF MEDICINE ACCORDING TO AGE.

HORSE.	OX.	SHEEP & SWINE	DOGS.	DOSE.
3 years	2 years	1 year	6 months	1 part
1 to 3 years	6 months	9 to 12 months	3 to 6 months	$\frac{1}{2}$ "
9 to 18 months	6 to 12 months	5 to 9 "	1 to 3 "	$\frac{1}{4}$ "
5 to 9 "	3 to 6 "	3 to 5 "	20 to 30 days	$\frac{1}{8}$ "
1 to 3 "	1 to 3 "	1 to 3 "	10 to 20 "	1-16 "

The foregoing table may serve as a guide to the proportionate amount of medicine to be given at the various ages. This refers to animals that are of ordinary size for their ages. Allowance should be made in case the animal is much under or over size. It is well also to make some allowance where the animal is of an exceedingly nervous temperament. A study of the effect of various diseases upon the action of medicine is very important. It will be found that in many diseases of the brain and spinal cord, and in some diseases of the stomach, a much larger quantity than usual of purgative medicines are necessary. On the other hand, in severe cases of low fevers and influenza, much less than the usual dose may prove fatal. Thus it can be seen that a careful study of the effect of medicine under various conditions is very essential.

HOW OFTEN TO GIVE MEDICINES.

Alteratives—may be given once or twice a day.

Purgatives—should not be repeated under twenty-four hours, even in severe cases, and in ordinary cases not under forty-eight hours.

Tonics—should be given two or three times a day.

Stimulants—if found necessary may be repeated after three hours.

Anodynes—may be repeated after an hour.

Ecbolics—may be repeated after forty-five minutes.

Febrifuges—or medicine to reduce temperature and allay fevers, should be given as often as every two or three hours in severe cases, and as often as three times a day in mild cases. Aconite, beladonna, the various forms of ammonia, spirits of nitre, and the solutions of the nitrate and chlorate of potash, are the most common of the febrifuges.

Table of Medicinal Substances, Their Doses and Action.

AGENT.	ACTION.		DOSE.
	INTERNALLY. EXTERNALLY.		
Arabic, gum	Demulcent	Antiseptic	Ad lib.
Acetic acid	Astringent	and Rubefacient	1 to 3 drams.
Arsenious acid	Tonic	Caustic	2 to 7 grains.
Acid, muriatic, dil. or	Tonic	Antiseptic and	1 to 3 fluid drams.
Acid, hyd. chl., dil.	Tonic	Caustic	
Acid, nitric, dil. 1-5	Tonic	Caustic	1 to 2 fluid drams.
Acid, sulphuric, dil.	Tonic	Caustic	1 to 2 fluid drams.
Aconite, tincture	Sedative	Sedative	10 to 20 drops.
Aconite, extract	Sedative	.....	15 to 20 grains.
Adeps (Lard)	.....	Emollient	.....
Aloes, extract	Purgative	.....	4 to 8 fluid drams.
Alum	Astringent	Astringent	2 to 4 drams.
Alum, burnt	.....	Escharotic	Dust freely.
	Stimulant		
Ammonia aqua	and	Stimulant	½ to 1 fluid dram.
	Antacid		
Am. spirit aromatic	Antacid	.....	½ to 1 fluid dram.
	Alterative		
Arsenic	and	.....	1 to 5 grains.
	Tonic		
	Alterative		
Arsenic, iodide	and	.....	2 to 10 grains.
	Tonic		
Borax	.....	Detergent	.....
Belladonna extract.	Narcotic	Sedative	1 to 2 drams.
		Caustic	
Carbolic acid	.....	and	
		Antiseptic	
Camphor	Narcotic	Discutient	1 to 3 drams.

Table of Medicinal Substances, Their Doses and Action.

AGENT.	ACTION.		DOSE.
	INTERNALLY.	EXTERNALLY.	
Cantharides	Stimulant and Diuretic	To Blister	5 to 15 grains.
Chloride of lime.	Antiseptic	Antiseptic	2 to 4 drams.
Chamomile	Tonic	. . . . .	2 to 4 drams.
Cayenne Pepper	Carminative	Rubefacient	10 to 20 grains.
Caraway	Carminative	. . . . .	2 to 4 drams.
Cascarilla bark	Tonic	. . . . .	2 to 4 drams.
Catechu extract	Astringent	. . . . .	1 to 2 drams.
Chloroform	Anaesthetic	. . . . .	1 to 2 drams.
	Diaphoretic	. . . . .	1 to 2 drams.
Colchicum	and Laxative	. . . . .	1 to 2 drams.
Collodion	. . . . .	Adhesive	. . . . .
Copaiba, balsam of	Diuretic	. . . . .	½ to 1 ounce.
	Antiseptic	Caustic	½ to 1 fluid dram.
Creasote	and Tonic	and Antiseptic	½ to 1 fluid dram.
Chalk, prepared	Antacid	Absorbent	2 to 4 ounces.
Croton oil	Purgative	Irritant	20 to 30 drops.
	Astringent	Erodent	1 to 2 drams.
Copper, sulphate of	and Tonic	and Excitant	1 to 2 drams.
Calomel	Cathartic	. . . . .	½ to 2 drams.
Corrosive sublimate	Alterative	Caustic	5 to 10 grains.
Digitalis	Narcotic	. . . . .	1 to 2 drams.
Ergot	Parturiant	. . . . .	2 to 4 drams.
Ether	Antispasm	Refrigerant	4 to 6 fluid drams.
Flax seed	Demulcent	. . . . .	Ad lib.
Gentian	Tonic	. . . . .	2 to 4 drams.
Gentian, tincture	Tonic	. . . . .	½ to 1 fluid ounce.
Ginger	Tonic	. . . . .	2 to 4 drams.

Table of Medicinal Substances, Their Doses and Action.

AGENT.	ACTION.		DOSE.
	INTERNALLY. EXTERNALLY.		
Glycerine	Nutrient	Emollient	4 to 6 ounces.
Henbane, extract of	Narcotic	Sedative	1 to 2 drams.
Henbane, tincture	Narcotic and Anodyne	Sedative	1 to 2 ounces.
Iodine	Glandular and Excitant	Glandular and Excitant	5 to 10 grains.
Iron, sulphate of	Astringent and Tonic	. . . . .	2 to 4 drams.
Iron, iodide of	Alterative and Tonic	. . . . .	½ to 1 dram.
Linseed oil	Laxative	Emollient	½ to 1 pint
Mercury, bichloride	Alterative	Caustic	5 to 10 grains.
Mercury, chloride	Alterative and Cathartic	. . . . .	10 to 20 grains.
Magnesia	Antacid	. . . . .	½ to 2 drams.
Magnesia, sulphate	Laxative	. . . . .	½ to 1 ounce.
Myrrh	Antiseptic and Tonic	Traumatic	½ to 1 pound.
Nut-galls	Astringent	2 to 4 drams.	
Nitrate of silver	. . . . .	Caustic	. . . . .
Olive oil	Demulcent and Laxative	Emollient	1 to 1½ pint.
Opium	Narcotic and Antispasm	. . . . .	1 to 2 drams.

Table of Medicinal Substances, Their Doses and Action.

AGENT.	ACTION.		DOSE.
	INTERNALLY. EXTERNALLY.		
Opium, tincture of	Narcotic and	Anodyne	½ to 2 fluid ounces.
Petroleum	Antispasm Stimulant	Stimulant	2 to 4 ounces.
Pimemta (allspice)	Stimulant and	. . . . .	2 to 4 drams.
Pitch, Burgundy	Tonic	Rubefacient	. . . . .
Pitch (Tar)	. . . . .	Rubefacient	. . . . .
Potash	. . . . . Antacid	Caustic	. . . . .
Potassium carbonate	and	. . . . .	2 to 4 drams.
Potassium, chlorate	Diuretic Stimulant (?)	. . . . .	1 to 2 drams.
Potassium, nitrate	Febrifuge and	Refrigerant and	2 to 4 drams.
Quinine	Diuretic Tonic	Antiseptic	½ to 1 dram.
Resin	Diuretic	. . . . .	½ to 1 dram.
Sabina	. . . . . Antacid	Irritant	. . . . .
Soap	and	Stimulant	½ to 2 ounces
Sal-soda	Diuretic Antacid	. . . . .	2 to 4 drams.
Soda sulphate (Glaubers salt)	and Diuretic	. . . . .	2 to 4 drams.
Soda sulphate (Glaubers salt)	Diuretic Diuretic	. . . . .	½ to 1 pound.
Spirit of nit. ether.	and	. . . . .	1 to 2 fluid ounces.
Sulphur, iodide	Antispasm Alterative	Detergent	½ to 1 dram.

Table of Medicinal Substances, Their Doses and Action.

ACTION.		DOSE.
AGENT.	.....
	INTERNALLY. EXTERNALLY.	
Strychnine	Stimulant to motor nerves.	1 to 3 grains.
Sulphur	Laxative and	Detergent 1 to 4 ounces.
	Alterative Nauseant	
Tartar, emetic	and Diaphoretic.	½ to 1 dram.
Turpentine	Diuretic	Digestive ½ to 1 ounce.
	Diuretic	2 to 4 fluid drams.
Turpentine oil	Antispasm	Irritant 3 to 6 fluid ounces.
	Cathartic	½ to 1 pint
Zinc, acetate	.....	Astringent
Zinc, carbonate	.....	Astringent
		Caustic
Zinc, chloride	.....	and
		Antiseptic
Zinc, oxide	.....	Astringent
	Astringent	Erodent
Zinc, sulphate	and	and 1 to 2 drams.
	Tonic	Astringent

Common Names for a Few Drugs.

Tincture of Opium	Laudanum.
Sulphate of Iron	Copperas.
Mercury, bichloride	Corrosive Sublimate.
Mercury, mild chloride	Calomel.
Sulphate of Copper	White Vitriol.
Cantharides	Spanish Fly.
Nitrous Ether	Sweet Spirits of Nitre.
Argentum Nitrate	Nitrate of Silver.

CHAPTER IV.

THE DIGESTIVE ORGANS,

Their Diseases and How to Cure Them.

DESCRIPTION OF ALIMENTARY CANAL, DISEASES OF THE TEETH, DISEASES OF THE MOUTH, DISEASES OF THE GULLET AND CESOPHAGUS, DISEASES OF THE STOMACH, DISEASES OF THE INTESTINES, DISEASES OF THE LIVER, INTESTINAL WORMS.

THE process carried on by the various organs of the alimentary canal thereby changing the form and character of the food, in order that it may be absorbed into the blood as nourishment is known as digestion. The organs whose functions it is to perform this work are known as the digestive organs. The first portion of the alimentary canal is the mouth, where are found the teeth for making the food fine and mixing it with the saliva from the salivary glands which open into this organ. By mixing the saliva with the food, dry substances become soft, are easily swallowed, and more easily digested. This saliva has another very important duty and that is, that by aid of a peculiar ferment called ptyalin, the starchy substances found in hay, grain, and roots are changed to maltose, then by taking on water further change to grape sugar. The digestion carried on in the stomach is called gastric digestion or stomach digestion, that in the small intestines intestinal digestion. The large intestines are used principally in absorbing the liquid coming from the small intestines and carrying off the refuse matter after the nourishing portion has been absorbed by the villi

which are processes or projections which line the small intestines, the greater number being found in their upper half. Whenever any portion of this wonderful canal does not properly perform its duties, there is a waste of food, and a lack of proper nourishment of the body. The following are the diseases to which this portion of the body is liable together with the treatment as given by Dr. Charles B. Michener, V. S. Inspector of Bureau of Animal Industry and Professor of Pathology and Obstetrics at New York College of Veterinary Surgeons. An authority that cannot be questioned.

DISEASES OF THE TEETH.

Cutting Teeth. From birth to the age of five years, the young horse is cutting his teeth. During this time two sets have made their appearance, the first or milk teeth and the second or permanent teeth. More difficulty is experienced in cutting the latter, and the mouth should be frequently examined, in order to see if one or more of the milk teeth are not remaining too long, causing the second teeth to grow in crooked, in which case the first teeth should be removed by the forceps. Also, see if the second teeth are causing little red tumors on the gums, if so make incisions through the gums down to the coming teeth. There is a tendency among farmers and veterinarians to pay too little attention to the teeth of young horses. Percival relates an illustration of this, which is best told in his own words :

"I was requested to give my opinion concerning a horse, then in his fifth year, who had fed so sparingly for the last fortnight, and so rapidly declined in condition in consequence, that his owner, a veterinary surgeon, was under no light apprehension about his life. He had himself examined his mouth, without having discovered any defect or disease ; though another veterinary surgeon was of opinion that the difficulty or inability manifested in mastication, and the consequent "cudding," arose from preternatural bluntness of the surfaces of the molar teeth, which were, in consequence filed, but without beneficial results. It was after this that I saw the horse ; and I confess I was, at my first examination, quite as much at a loss to offer any satisfactory interpretation as others had been. While meditating, however, after my inspection, on the apparently extraordinary nature of the case, it struck me, I had not seen the tusks. I went back into the stable and discovered two little tumors, red and hard, in the situation of the inferior tusks, which when pressed gave the animal great pain. I instantly took

out my pocket-knife and made crucial incisions through them both, down to the coming teeth, from which moment the horse recovered his appetite and by degrees his wonted condition."

Irregular Teeth. In large cities there is a class of "veterinary dentists" and it is a fashion to call these humbugs and have the teeth regularly "floated" or "rasped." In some instances rasping is beneficial, but in most cases it is entirely unnecessary. The rubbing or grinding surface of the horse's teeth should be rough, hence rasping them down flat and even is injurious. Remember that the upper jaw is a little wider than the lower and hence the teeth do not fit exactly one over the other and after a sharp ridge is left unworn on the inside of the lower molars and the outside of the upper molars, it may excoriate, (lacerate or cut) the tongue or lips. This condition can readily be felt and these sharp cutting ridges when found should be rasped down by a guarded rasp. Any one can do this without the aid of a veterinarian. In some instances the first or last molar tooth is unnaturally long, owing to the absence of its fellow on the other jaw opposite. If this is the case, call a veterinarian who has the necessary forceps or chisel for cutting it.

Decayed Teeth. When a tooth is decayed it is quite common to find the tooth, corresponding to the decayed one, on the opposite jaw very much lengthened, sometimes so much that the mouth can not be perfectly closed. Such teeth also need a veterinarian with proper tools. In all cases where horses "quid" their food, or where they are slobbering, or show pain when chewing their hay or grain, which is shown by their holding their head to one side when chewing, the teeth should be examined. If as in most cases these symptoms are due to sharp corners, or edges these must be removed by the rasp. If decayed teeth are found or any other serious difficulty call an expert.

Toothache. This is very rare in the horse, and usually is caused by a decayed tooth. It is only found in the molar teeth. The horse will show pain while drinking cold water, or while eating. They will sometimes suddenly stop chewing, throwing the head to one side, and slightly open mouth. They act as if some sharp body had punctured the mouth. If these symptoms appear, examine the horse for some foreign body, and if not found carefully examine each tooth. If you are not able to do this with the hand in the mouth, you can in most instances discover the aching tooth by pressure from the outside. The horse will flinch when the sore tooth is pressed upon.

What to Do. The only thing that can be done in most cases, is to take the tooth out, and this should only be attempted by the veterinarian.

Parrot-mouth. This is a deformity of the mouth that interferes with the teeth fitting properly one over the other, hence hindering proper mastication and thus indirectly with digestion. In a parrot-mouth the upper incisors (front cutting teeth) project in front of and beyond the lower ones. The teeth of both jaws become unusually long, as they are not worn down by friction. Horses having parrot-mouths find it very difficult to eat grass if not cut for them.

What to Do. Little can be done, except to frequently examine the mouth and if the teeth of the lower jaw become so long that they bruise the "bars" of the upper jaw, they must be shortened by the rasp or saw. Horses with this deformity should never be left entirely at pasture.

DISEASES OF THE MOUTH.

Lampas. The mucous membrane (skin) covering the hard palate (roof of the front part of upper jaw) occasionally becomes swelled and projects in a more or less prominent ridge just back of the upper front teeth (incisors.) This is called lampas. In rare instances, particularly while teething, there is congestion and swelling of this part of the roof of the mouth sufficient to interfere with feeding. In one instance only in the extensive practice of Dr. Michener has he found a case where the swelling was so extensive as to have it caught between the front teeth when the horse attempted to eat.

What to Do. If the swelling is very bad a resort to scarifying should be had, being careful not to cut deeply into the structures. A wash of strong alum water may also be beneficial. Burning of the lampas, so often recommended, is cruel and unnecessary, it should never be permitted, as it often causes serious results to follow.

NOTE.—It is a quite common opinion among owners of horses and stablemen that lampas is a disease that very frequently exists. In fact whenever a horse fails to eat, and if he does not exhibit very marked symptoms of a severe illness, they say at once "he has the lampas." It is almost impossible to convince them of their error, yet in a practice of fifteen years Dr. Michener has never seen but two or three cases of what is called lampas that gave the least trouble, or that called for any treatment whatever. It may be put down, then, as more of a disease of the stableman's imagination than of the horse's mouth.

Inflammation of Lining of the Mouth. This is scientifically called STOMATITIS. It is an inflammation of the mucous membrane lining the mouth, and is produced by irritating medicines, foods, or other substances. The symptoms are swelling of the mouth, which is hot and painful to the touch; copious discharge of saliva; mucous membrane reddened; sometimes ulcers appearing.

What to Do. The treatment is simple, soft feed alone often being all that is necessary. In some cases it may be advisable to use a wash of chlorate of potash, borax or alum, about one-half ounce to a pint of water. Hay should be fed steamed, and all other foods in soft condition.

Inflammation of the Tongue. The true name is glossitis and is very similar to stomatitis, generally exists with it and due to same causes. The treatment is the same. If it is caused by injuries to the tongue which are severe enough to produce lacerations or abscesses. Call an expert.

Excessive Saliva. Ptyalism or salivation is an excessive secretion of saliva. Often seen as a symptom of irregular teeth, inflammation of mouth or tongue, or use of such medicines as lobelia, and mercury. Some foods produce it, as clover, particularly second crop; wheat chaff or corn-cobs lodged in the mouth. When cause is removed, usually the trouble ends. Alum water may be applied to the mouth with a sponge.

Pharyngitis. This is inflammation of the lining of the pharynx (back part of the mouth). Generally accompanied by stomatitis, glossitis, or laryngitis. When mostly confined to pharynx, there are fever symptoms, difficulty in swallowing; soreness over larynx (large ring of windpipe); increased flow of saliva; difficulty of swallowing liquids and cough only when trying to drink.

What to Do. Give chlorate of potash in half ounce doses three or four times a day. Mix with licorice root powder and honey and give with a strong spoon or wooden paddle. Borax or alum in same size doses may be given suspended in warm water, if the chlorate of potash is not handy.

Paralysis of the Throat. This is properly called Paralysis of the Pharynx, and is one of the most stubborn diseases of the horse. The horse is unable to eat; manger contains saliva and frothy food that has returned through the nose; horse has anxious countenance; pulse, respiration, and temperature, at first about the same as in health; animal tries to eat or drink but unable to do so; if water is offered the animal

will try to drink by the hour, and apparently does so, but the water in the pail does not lower ; food returns through the nostrils or is dropped from the mouth quidded. There is no apparent obstruction and no symptoms except that the parts are flabby to the touch.

What to Do. Treatment is very unsatisfactory. Apply some blisters behind and under jaw. Swab mouth frequently with alum or chlorate of potash, one ounce to a pint of water, by means of sponge on end of stick. Strychnine is the best thing to be used to overcome this paralysis, and should be given in one-grain doses three or four times a day. This medicine should be given as a hyperdermic injection deep into the pharynx. As a rule the external blister, frequent swabbing as above, and a nerve stimulant are all that can be done.

Abscesses in the Pharynx. Symptoms resemble laryngitis or distemper. If breathing is interfered with, which increases, and without swelling or only slight and increasing fullness there may be an abscess in this location. About all that can be done, is to hurry the ripening of abscess, by steaming with hops, or hay. If the abscess can be felt through the mouth call a veterinarian to open it.

DISEASES OF THE GULLET.

Choking. The mechanical trouble of choking is quite common. It is often caused when the animal is suddenly startled while eating apples or roots, and we should never suddenly approach or put a dog after horses or cows that are feeding upon such substances. If left alone they rarely choke, but if startled they try to swallow before the food is properly masticated and choking is the result. Choking also arises from horses bolting their food, hence avoid narrow deep grain mangers. Wheat chaff is also a frequent source of choke. Whatever the object causing the choking it may lodge in the upper part of the œsophagus (pharyngeal choke) in the middle part (cervical choke) or close to the stomach (thoracic choke). The symptoms will vary according to position of the body causing the choke.

Pharyngeal Choke. The object is lodged in upper portion of the œsophagus. Animal in great distress; hurried breathing; frequent cough; sweating; trembling or stamping of fore-feet. Abdomen rapidly distend with gas. The object can usually be felt in the upper part of the throat, and can be removed by the hand.

Cervical Choke. The object is lodged anywhere between the throat-latch and the shoulder. The object can be both seen and felt.

Symptoms not so severe ; animal occasionally draws himself up ; arches his neck ; and sometimes utters a loud shriek ; expression anxious, and attempts at vomiting made ; abdomen full. Soften or lubricate the obstruction by pouring oil or mucilaginous drinks, as flax-seed tea, down the gullet. Endeavor to move object by gentle pressure with the hands. If oats or chaff, gently squeeze the lower portion trying to loosen a little at a time. Work at least an hour before giving up, then if a failure, use the probang.

Thoracic Choke. Symptoms less severe, yet similar to above, and if choke is not found between throat-latch and shoulder, it is probably lower down. It can be successfully treated by means of the introduction of oils and mucilaginous drinks and the probang.

Probang and How to Use It. In the absence of the regular instrument, which must always be flexible and finished with a smooth cup-shaped extremity, use an inch hose. Keep mouth open with a gag of wood, head slightly raised and extended. The probang carefully guided by the hand into the upper part of the gullet and gently forced down until the obstruction is reached. Pressure then should be gradual and firm. Do not use too much force, keep up a firm pressure until you feel the object moving, after which you are to follow it rapidly to the stomach. Never allow a whip-stalk or shovel handle to be used.

DISEASES OF THE STOMACH.

Stomach Staggers or Gorged Stomach. Properly named impaction. The stomach is so filled and distended that it loses all power of contracting upon its contents. It is occasioned by too large a feed after a long fast, or when animal has gotten loose and gained access to grain bin and eaten ravenously. The small stomach of the horse and inability to vomit will account for its frequent occurrence. The animal is dull and heavy, or drowsy; slight colicky symptoms are observed, which are continuous; rarely lies down; carries head extended and low; nearly touching the ground. Dullness increases; eyes are partially closed, vision impaired; thrusts head against side of stall; paws or even climbs with fore-feet. Breathes less frequently than in health; the pulse slow and sluggish. All symptoms increase rapidly in severity; soon becomes delirious; cold sweat on body; trembles violently; slobbers out a sour fermenting mass; staggers from side to side, and plunges till he drops dead.

Treatment. This is very unsatisfactory. Give a purgative of Barbadoes aloes, one ounce. Then try to stimulate the walls of the stomach to contract by giving cayenne pepper, one-half ounce, or Jamaica ginger one-half ounce. Give rectum injections of two ounces of turpentine into eight ounces of linseed oil.

Tympanitis of the Stomach. This is of frequent occurrence yet not treated separately in works on veterinary medicine. Causes and symptoms similar to the last, yet distinct enough to enable the careful observer to tell one from the other. In tympanitis the distension is caused by gas instead of by food. This corresponds to "hoven" in cattle and is due to overloading the stomach with young growing herbage, clover in particular, or feeding extra meal immediately before a hard journey. The flanks are distended with gases and the horse tries to retch or vomit.

What to Do. Treatment must be prompt and energetic. Some antacid must be given. As it usually occurs on the road and probably some distance from a drug store, hasten to the first house. Get common BAKING SODA and give two to four ounces as quickly as possible. One-half ounce of cayenne pepper or two ounces of black pepper may be added to this with advantage, as it serves to aid the walls of the stomach to contract and expel the gas. Any medicine that will check or stop fermentation, or absorb the gas may be given, as for example: charcoal in any amount; chloride of lime, one-half ounce; or carbonate of ammonia, one-half ounce. A physic of one ounce of aloes or one pint of linseed oil should be given to unload the stomach. Learn this lesson from these attacks—that when an animal is expected to do an unusual amount of work it will be best done on its usual amount of feed. Don't be so humane (?) as to extra feed just before the journey, but wait until your journey's end, and even then don't feed until the animal is thoroughly rested. Many a faithful animal has been killed by the kindness of its master.

Rupture of the Stomach. This usually occurs as a result of engorged or tympanitic stomach, and there is no treatment that can be of any use whatever. Could one be sure that this is the trouble it would be best to destroy the animal at once, but there is always an uncertainty, as it may be only a very severe case of engorged or tympanitic stomach and the animal may recover, hence give powdered opium in one dram doses every two or three hours in addition to remedies as recommended for tympanitis.

Gastritis. This is an inflammation of the mucous membrane lining the stomach. Symptoms not well marked and are generally due to mechanical irritation or irritating or corrosive poisons in large quantities. There is a feverish condition, colicky pains, and intense thirst. When poisons have produced gastritis there will be other symptoms according to the poison swallowed.

Lead Poisoning. This occurs near paint works, near newly painted buildings and fences, and where paint kegs are left in the fields, and where water runs through new lead pipes. Lead poisoning produces labored breathing, abdominal pains, partial paralysis, tottering gait, convulsions, and death.

What to Do. Give thirty to sixty drops of sulphuric acid in a half gallon water. Follow with or precede if not ready at hand, either milk, white of eggs, oil of any kind, flaxseed, gruel or tea. If the poison is due to long taking of small quantities of lead or from water flowing through new lead pipes, give from one-half to a pound of Epsom salts. Iodide of potassium in one dram doses, twice a day are of much service. If much pain is manifest, give three to five grain doses of morphine, two or three times a day.

Arsenic Poisoning. When the poison is arsenic there will be symptoms of abdominal pain, nausea, purging accompanied by an offensive odor, staggering gait, quickened breathing, paralysis of hind extremities. Poisoning from arsenic is most common where sheep have been dipped in arsenical baths to cure "scab" and then run on pasture without first drying their wool. Arsenic is thus deposited on the grass and is eaten by animals in the pasture. Give oil, milk, white of eggs, and flaxseed gruel or tea. Powdered opium in one-half dram doses two or three times a day may be given to allay the pain and inflammation. Care should be observed in feeding for a time, giving only soft and easily digested foods.

NOTE.—Gastritis may also occur from poisoning by copper, corrosive sublimate, and some vegetable poisons.

Stones in the Stomach. Gastric concretions, calculi (stones) in the stomach have been most found in millers' horses. A small piece of mill stone or other substance forms a centre around which is gathered in layers the stony substances which abound in their feed, (sweepings from the mill floor). There are few symptoms exhibited that will lead us to suspect calculi and probably none by which we can unmistakably assert its presence. There is a depraved capricious appetite; a disposi-

tion to eat any thing within reach. They sometimes have repeated attacks of colic, which recover abruptly; and the animal assumes a position to relieve pain—sitting on haunches, or standing with front feet on an elevation. There is no effective remedy, all that can be done is to give physic to move the bowels, to relieve pain, and to combat the inflammation.

Bots—Larvæ of the Gad-fly. There are so many wrong opinions concerning the bot and the harm it is supposed to do the horse, that we give it considerable space. Of the many insect parasites and other tomentors of the horse, mule, and other solipeds, the gad-fly is of the most importance. Cobbold, who is the best authority on the subject, says:

“The common gad fly attacks the animal while grazing late in the summer, its object being not to derive sustenance, but to deposit its eggs. This is accomplished by means of a glutinous excretion, causing the ova (eggs) to adhere to the hairs. The parts selected are chiefly those of the shoulder, base of the neck, and inner part of the fore-legs, especially about the knees, for in these situations the horse will have no difficulty in reaching the ova with its tongue. When the animal licks those parts of the coat where the eggs have been placed, the moisture of the tongue, aided by warmth, hatches the ova, and in something less than three weeks from the time of the deposition of the eggs the larvæ have made their escape. As maggots they are next transferred to the mouth and ultimately to the stomach along with food and drink. A great many larvæ perish during this passive mode of immigration, some being dropped from the mouth and others being crushed in the fodder during mastication. It has been calculated that out of the many hundreds of eggs deposited on a single horse scarcely one out of the fifty of the larvæ arrive within the stomach. Notwithstanding this waste the interior of the stomach may be completely covered (cuticular portion) with bots. Whether there be few or many they are anchored in this situation chiefly by means of two large cephalic hooks. After the bots have attained perfect growth they voluntarily loosen their hold and allow themselves to be carried along the alimentary canal until they escape with the feces. In all cases they sooner or later fall to the ground and when transferred to the soil they bury themselves beneath the surface in order to undergo transformation into the pupa condition. Having remained in the earth for a period of six or seven weeks, they finally emerge from their pupal-cocoons as perfect dipterus (winged) insects

the gad-fly. It thus appears that bots ordinarily pass about eight months of their lifetime in the digestive organs of the horse."

The species just described infest chiefly the stomach and duodenum (small intestine leading from the stomach.) The idea, almost universally obtained, that bots often cause colicky pains is wrong. It is common to hear by-standers declare that almost every horse with the "belly ache" "has the bots," and their treatment is varied and heroic. Dr. Michiner says in his practice he has never known bots to be the cause of any disturbance. The opinion that "bots have eaten through the stomach" when the stomach is found ruptured is also an error. BOTS ARE HARMLESS. Even if they were not, there are no medicines that affect them; neither acids, nor alkalies, nor anthelmintics (worm medicines) nor anodynes cause them to become loose and pass out the body. To prevent them watch for their eggs on the legs and different parts of the body in the late summer and autumn, scrape them off and burn them. It is useless to try and remove them, they go at their appointed time during May and June.

Indigestion. This is the name applied to all conditions where from any cause digestion is imperfectly performed. The trouble called indigestion is not severe enough to produce colic, yet it is troublesome and the most frequent of all digestion disorders. The seat of the trouble will vary. Teeth are often at fault, examine for sharp irregular edges or decayed teeth, (see remedies suggested under teeth.) The principal seat however of the trouble is the stomach or the small intestines. Whenever the secretions from these organs are excessive or deficient dyspepsia or indigestion must follow. It is often caused from "bolting" the food (then get larger manger and spread out feed) or wintering on hard dry hay or corn-stalk, and other bulky and not very nutritive food; irregular feeding or over feeding. Indigestion is shown by irregular appetite, refusing food at one time and at others eating ravenously; appetite depraved; bowels irregular; one day loose and bad smelling, the next bound; grain often passed through whole; hay passed in balls; animal passes wind having a sour odor; skin hard, dry, and tight (hide bound).

What to Do. After observing all that has been said regarding feeding under its special head if no improvement is seen, give a physic, aloes one ounce or linseed oil one pint. There is usually a tendency to gas which distends stomach and bowels, for which use the following alkaline treatment. Baking powder, powdered ginger, powdered gen-

tian, four ounces each, mix and give heaping tablespoonful twice a day before feeding. This powder is best given by dissolving the above dose in a half pint of water and given as a drench.

DISEASES OF THE INTESTINES.

Spasmodic or Cramp Colic. Commonly called gripes. It is that form of colic produced by contraction, or spasm, of a portion of the small intestines. It is caused by indigestible food; foreign bodies, as nails or stones in the bowels; large drinks of cold water when the animal is warm; driving a heated animal through deep streams; cold rain; draughts of cold air; etc.

Study the Symptoms. Study carefully the symptoms to distinguish this from other forms of colic requiring quite a different treatment. Spasmodic colic always begins suddenly. If feeding, the horse stops suddenly, stamps impatiently, looks backward, then resumes feeding, to be followed by pawing, suddenly lying down, rolling, and getting up. Then an interval of ease, and the animal eats again and appears well. Then the pain returns increasing in severity only to pass off for a time. The intervals of ease getting shorter and shorter. Animals with this kind of colic show the most severe pain; they throw themselves down; roll over and over; jump up; whirl about; drop down again; paw or strike with the front teeth steam; and sweat; make frequent attempts to pass urine with partial erection. Only a small quantity of water passed at a time, because the bladder being so frequently emptied, THERE IS BUT LITTLE WATER TO PASS. The attempts to urinate are often thought to be sure symptoms of kidney and bladder trouble. Remember diseases of the bladder or kidneys are very rare. The stomach and intestines are diseased a thousand times, where the kidneys or bladder is once. The attempts to pass water and failure to do so are not enough to warrant the decision that the animal has "trouble with his water," neither should a statement be made that the horse has kidney disease, even if it yields or sinks when pinched over the loins. Try this pressure on any horse, and nearly all will yield; this is rather a sign of health than a symptom of disease.

Keep in mind the conditions to which the animal has been subjected; the suddenness of the attack; the intervals of a lessening of pain (growing shorter as the case progresses); the severe pain; the temperature and pulse getting natural during the intervals of pain; the frequent attempts

to pass urine ; if a male, the erections ; etc. ; and there is but little danger of mistaking this for any other form of colic.

What to Do. The pain being due to spasms or cramps of the bowels, medicines should be given to overcome these spasms, viz.: anti-spasmodic. The best remedy is one ounce of chloral hydrate in a half-pint of water. Another remedy quite common and effectual is two ounces each of sulphuric ether and laudanum in half-pint of linseed oil. Still another remedy may be composed of two ounces of sulphuric ether and eight ounces of alcohol. If nothing else is at hand give one-half pint of whiskey in hot water. If the animal is not relieved in an hour repeat the dose.

Keep the body very warmly clothed and try to get the animal to perspire. Blankets dipped in very hot water to which a small quantity of turpentine has been added, should be fastened around the belly and covered with dry blankets; the belly may be rubbed with stimulating liniments or mustard water. The difficulty of keeping the hot blankets in place while the horse is violently moving about during the spasms of pain forces them in most cases to be abandoned. If the cramp is due to irritants in the bowels, a cure is not complete till the offending irritant is removed, and a cathartic consisting of one ounce of aloes or one pint of linseed oil should be given. Injections into the rectum of warm soapy water, or salt and water, aid the cure. The injection or enema should be lukewarm and from three to six quarts given at a time. Exercise will aid the action of the bowels in this and similar colicky troubles, but severe galloping or trotting should be avoided.

Treatment of Wind Colic. Sometimes called tympanitis or bloat. The most frequent causes of this form of colic are sudden changes of food; too long fasting and then food given while the animal is very tired; new hay or grain; large quantities of green food; food that has soured in the manger or mixing tub; indigestible food; irregular teeth; crib-biting; in fact anything that interferes with indigestion.

Symptoms. This colic is not so suddenly developed, nor are the symptoms so severe as in spasmodic or cramp colic. The animal is at first dull, paws slightly, may or may not lie down. The pains are continuous; the belly enlarged, and when struck in front of the haunches a drum-like sound is heard. If not soon relieved the symptoms are aggravated and in addition there is difficult breathing; profuse sweating; trembling of hind-legs; animal sighs when breathing; staggers from side to side; and, finally, plunges forward dead. The distinguishing

symptom of flatulent or wind colic is the bowels filled with gas, which is detected by the bloated appearance and the drum-like sound when struck in front of the haunches.

Treatment for Wind Colic. The treatment for wind colic differs very much from the treatment for spasmodic or cramp colic. Gases have been formed and alkalines are used to neutralize them and they must be promptly given. Give baking-soda (bicarbonate of soda) in doses of two to four ounces. If this fails give chloride of lime in half-ounce doses, or the same quantity of carbonate of ammonia, every half-hour till relieved. Charcoal may be given in large quantities. Relaxants and antispasmodics are beneficial in this form of colic, and as chloral-hydrate is a relaxant and antispasmodic and also an anti-ferment and pain-reliever it is particularly well adapted in the treatment of wind colic. Give in doses of one ounce in a half-pint of water. A physic should always be given in flatulent colic as early as possible, the best being aloes in doses of one ounce. Injections into the rectum of turpentine one to two ounces, mixed with linseed oil eight ounces, may be given to stimulate the peristaltic movement of the bowels to aid in the expulsion of the gases.

Wind colic is more fatal than spasmodic and requires prompt and persistent treatment. It is unsafe to predict results, some mild cases going on to speedy death, and some severe ones responding easily to treatment. Do not give up your efforts till you are sure the animal is dead. Blankets wrung out of hot water and renewed every five or ten minutes will do much to afford relief.

Impaction of the Large Intestines. This is a very common bowel trouble, and one if not recognized and properly treated results in death. It is caused by over-feeding especially of grain, and is most common where rye is fed either alone or with other grain; old, hard, dry hay, or stalks when largely fed; lack of water; want of exercise; etc.

Symptoms. There is abdominal pain, which may disappear for a day or so to return again. The feces passes more frequently but in small quantities and dry; the "belly" is full, but has no drum-like sound; the animal paws and then looks back at his side. The most characteristic sign is the horse lying flat on his side, head and legs extended, occasionally raises his head to look at his flank; he remains on his side often from ten minutes to a quarter of an hour. The animal rises at times, walks about the stall, paws, look at his sides, backs up

against the stall which he presses with his tail, and then lies down on his side again stretching out his legs. The pulse is little changed at first, being full and sluggish; later if condition is not improved, the pulse becomes rapid and feeble.

The Treatment. This consists in efforts to produce movements of the bowels. A cathartic is to be given, care being taken to give a full dose. Powdered aloes, one ounce; calomel two drams; and powdered nux vomica one dram should be given. In place of this linseed oil one pint and fifteen drops of croton oil may be used. Some give Epsom salts one pound with one-quarter pound of common salt claiming this makes the animal thirsty and the water of which it will drink large quantities will soften the hardened mass in the large intestines thus favoring its expulsion. Remember it takes from twenty to thirty hours before a horse responds to a physic, and under no circumstances should the dose be repeated in less time. If aloes have been given and have failed to operate, follow at the proper time with oil or some different cathartic. Give the animal all the water he will drink. The action of the physic may be aided by giving every three or four hours, one-half ounce of tincture of belladonna, or one-half dram of nux vomica. Injections into the rectum should be given every hour using at least six quarts at a time and varied; give first soapy water, then salt and water, then one ounce of turpentine mixed with eight ounces of linseed oil. Rubbing or kneading of the "belly," putting on stimulating liniments or strong mustard water will at times favor the expulsion of the hardened mass. When relief is not obtained it runs into inflammation of the bowels, and death follows.

Constipation or Costiveness. This is a common disease in the adult horse, particularly in the foal. Many colts die every year from failure on the part of the attendant to note the condition of the bowels soon after birth. Whenever the foal fails to pass feces or shows signs of colicky pains, immediate attention must be given. A few injections of soapy water in the rectum to break down any hardened mass is usually all that is necessary. If this is not effective, a purgative must be given. Oils are the best for these young animals, and two to four ounces of castor oil should be given. The foal should always get the first of its mother's milk, as this milk, for a few days, possesses decided laxative properties. Constipation in adult horses is usually the result of feeding on dry, innutritious food, scanty water supply, or lack of exercise. Usually a change to light, sloppy food, linseed gruel or tea,

with plenty of exercise is all that is required. Sometimes two-dram doses of extract of belladonna three times a day will be necessary, or daily handful doses of Epsom salts in the feed.

Intussusception or Invagination. This is a slipping of a portion of the intestine into another portion immediately following, like a partially turned glove finger. It may occur at any part, but most common in the small intestines. This is most likely to occur in horses that are suffering from spasm of the bowels. It may occur during the existence of almost any abdominal trouble, as diarrhea, spasmodic colic, inflammation of the bowels, etc. There are no symptoms by which it can be positively known. If there is severe straining it should be given attention, particularly if accompanied by colicky pains and constipation. In some cases the horse recovers and if this is suspected, call a veterinarian, he may be able to relieve the animal.

Twisting of the Bowels or Gut-tie. Volvulus or gut-tie is a somewhat common accident, and occurs quite frequently from the violent manner in which the horse throws himself about when affected with spasmodic colic. The symptoms are the same as those of obstruction of the bowels and should be treated in the same manner.

Diarrhea. Moldy or musty food, stagnant water, diseased teeth, eating irritating substances, feeding on low, marshy pastures and exposure during cold nights, will produce this disease. It is more often a symptom of some other disease; rather than an organic disease. Diarrhea may exist as a complication of other diseases, as pneumonia and influenza or during disease of the liver. The symptoms are frequent liquid stools, with or without abdominal pains.

What to Do. Treatment at times is very simple, but requires the utmost care and judgment. If due to faulty food and poor water, change them. If due to some irritant in the intestines, give one pint of linseed oil. If however purging continues, it may be checked by giving wheat flour in water, starch water, white-oak bark tea, or half dram doses of sulphuric acid in one-half pint of water two or three times a day. Powdered opium, two drams; subnitrate of bismuth, one ounce; repeated three times a day, gives good result. Horses that scour on the road, should be watered and fed as long as possible before driving. If there is much bloating or flatulency during diarrhea, baking soda in doses of from two to four ounces often cures. If the discharges are very offensive in odor this can be remedied by giving one ounce of sulphite of soda or half a dram of carbolic acid in water, morning and night.

Superpurgation. This is the name given to that diarrhea or flux induced by and following the action of a physic. It is accompanied by irritation or even inflammation of the bowels, and is always of a serious character. In rare cases it follows an ordinary dose of physic. It is usually the result of too large a dose of physic; to giving physic to horses suffering from pneumonia, influenza, or other debilitating diseases; to riding or driving a horse when purging; to exposure or draughts of cold air, or giving large quantities of cold water while physic is operating. There is always danger of superpurgation if a physic is given a horse suffering from diseases of the respiratory organs. When physic is given always feed the animal on sloppy food or mash, until the physic begins to operate; clothe the body with a warm blanket; keep out of draughts. After physic has thoroughly operated, the purging can generally be stopped by feeding dry oats and hay. If it does not stop give flax-seed tea, oatmeal or wheat-flour gruel. If these are not satisfactory in result, give one-half dram doses of sulphuric acid in one-half pint of water twice or three times a day. If the animal has become weakened, give brandy in doses of from two to four ounces, with milk and eggs four or five times a day. 'Founder' is a frequent result of this disease, and should be guarded against by removing shoes and standing the horse on moist sawdust or some similar bedding.

Dysentery or Bloody Flux. This disease is characterized by coffee-colored or bloody discharges, liquid, and very offensive in odor and passed with much tenesmus (straining). It is rare in the horse.

Symptoms. The first symptom is a chill which will probably pass unnoticed. The discharges are offensive and for the most part liquid, although it is common to find lumps of solid fecal matter floating in the liquid portion; shreds of mucous membrane and blood are passed; there is much straining, and, occasionally, symptoms of abdominal pain; the animal lies down a great deal; pulse is quickened and the temperature raised. The appetite may remain fair, but in spite of this the horse continues to lose flesh, and becomes a sorry looking object. Thirst is a prominent symptom. Death usually follows in from one to three weeks.

What to Do. Care and feeding is more to be depended upon than any drugs or medicine. First the horse should be placed in a warm, dry, well ventilated stable; the skin is to receive attention by frequent rubbings and the body should be well blanketed and the legs bandaged. Water pure and given in small quantities; the food should be light and easily digested. As to medicine give first a light dose of castor oil,

about one-half pint to which add two ounces of laudanum. The vegetable and mineral astringents may also be given. Starch injections containing laudanum often afford great relief. Strength should be kept up by milk punches, eggs, beef tea, oat-meal gruel, etc. In spite of the best of care and treatment, dysentery proves fatal oftener than it comes to a successful ending.

Inflammation of the Bowels or Enteritis. This is an inflammation of the mucous membrane lining the bowels. This inflammation may extend and effect the muscular and also the serous coats. The disease is rare unless it is caused by irritants or corrosive poisons, or following invagination or twisting of the bowels.

How to Know Enteritis. Fever symptoms mark, from the outset, all attacks. The lining of nose, mouth, and eyes are congested and reddened, the mouth is hot and dry, respirations are increased, pulse is hard and rapid, temperature is raised to 103° or 105° . Colicky pains are continuous. Horse keeps moving; paws; lies down carefully; and will often turn himself upon the back, remaining in that position for some time; thirsty, and as a rule the bowels are sluggish or inactive, but when due to irritant foods or medicine purging may be present. The inflammatory pulse; position of horse when down; coldness of ears and legs; high temperature; continuous pain, which is increased upon pressure, will enable the careful observer to safely diagnose a case of inflammation of the bowels.

What to Do. Rely principally upon opium internally. Give one to two drams of powdered opium every three or four hours. One dram extract of belladonna should be added to the above doses of opium. Calomel in one dram doses to be given twice a day is recommended. Do not as a rule give purgatives or enemas; and keep the bowels as quiet as possible. Hot blankets applied to the belly and counter-irritants to abdomen are useful. Give linseed tea, oatmeal gruel, and starch water. Avoid solid food, especially if hard dry and indigestible. If when the inflammation has subsided, the bowels do not act, encourage action by walking the horse and give injections into the rectum. Should these fail then give oil.

Apoplexy of the Large Bowels. By some called muco-enteritis. This is much more common and most rapidly fatal of the bowel diseases. It is most common in heavy draught horses. It seems to be induced by the same causes that produce enteritis. Post-mortem examination reveals extensive clotting of blood between the mucous and

muscular coats of the large bowels; and thickened walls sometimes two or three inches in thickness.

Symptoms. There is a rapid and very weak pulse; profuse perspiration; severe and persistent pain, labored respiration, and a paleness of the mucous membrane of the anus. A peculiar, anxious expression exists that, when once seen is always remembered to denote this disease. Toward the last the horse sighs, breathes loudly, staggers and pitches about, and dies in a state of delirium. They rarely live more than ten or twelve hours, and often die inside of six.

What to Do. The case has usually advanced so far, before noticed that treatment is of no avail. The best common remedy is white-oak bark tea given in large and frequent doses. Tannic acid, one dram or fluid extract of ergot, one ounce is more desirable if at hand, and should be given every half-hour till four or five doses have been administered. Apply blankets to body, wrung out of HOT water, in which turpentine has been sprinkled; mustard water should be applied with sharp rubbing to the legs.

Peritonitis. This is an inflammation of the membrane lining the cavity and covering the viscera contained in the cavity below or back of the diaphragm, and known as the abdominal cavity. Peritonitis is often caused by injuries to the abdomen such as wounds, blows, kicks, and is still more common following the operation of castration.

Symptoms. This disease is usually preceded by a chill; the animal does not care to move, and if forced to do so, moves with a stiff or sore gait; paws with front feet and may strike belly with hind ones; lies down very carefully; stands most of the time; walks uneasily about. Generally constipated. Pressure on belly, causes sharp pain, and the horse will usually bite, strike, or kick at you if so used; the body is tucked up; and the feet, legs, and ears are cold. Temperature reaches 102° to 104°. The pulse is almost enough in itself to determine the disease; it is quickened, beating seventy to ninety times a minute, and HARD and WIRY.

What to Do. Treat similar to enteritis. Powdered opium one or two drams, with calomel, one-half dram, should be given every two, three, or four hours. These constitute our main dependence in this disease. Extensive mustard plasters or even mild blisters over the belly are very beneficial. NEVER give purgatives during the disease. Should it be necessary to move the bowels it may be done by gentle enemas. This is seldom necessary.

DISEASES OF THE LIVER.

Horse Has No Gall Bladder. The liver in the horse is rarely the seat of disease. There is a difference in the anatomical arrangement of the liver in the horse from that of man. It is a very common thing to hear some local "horse-doctor" say that a horse "has disease of his gall bladder." Truly a little learning is a dangerous thing, and this local "horse doctor" thus unwittingly exposes his ignorance, as the horse has no such organ. Diseases of the liver in horses are very obscure and generally remain unnoticed till death. There are a few symptoms when present, that should make us examine the liver carefully. These are yellowness of the lining of the mouth, nose and eyes; and the condition of the dung, it being light in color and pasty.

Inflammation of the Liver. This disease is technically known as hepatitis, and may assume an acute or chronic form.

Symptoms. The distinguishing characteristics are dullness; evidence of internal pain, but not of a severe type; constipated and clay colored dung balls; scanty and high colored urine; and general fever symptoms. Lies down on left side; looks towards the right side; which upon close inspection will be found to be enlarged over the posterior ribs, (see location of liver in manikin) where pain is manifested if pressure is used. The symptoms of this trouble are very obscure, especially the chronic form, and even with the experienced veterinarian it is mere "guess-work."

What to Do. Give first one ounce of Barbadoes aloes or some other physic. Apply a large blister to the right side, extending from a little back of the girth backward to the last rib, and about fifteen inches wide, midway between the middle and back of belly. Four to six quarts of blood may be drawn from the jugular vein, (see location of same on manikin) if taken in the early stages of the disease. After physic operates, saline medicines to act on the liver should be given. One ounce doses of saltpeter or muriate of ammonia, three or four times a day are beneficial. Feed the horse sparingly and principally on bran mash. If recovery takes place, which is somewhat doubtful, give the animal regular exercise and light food.

Jaundice, the Yellows or Icterus. This is the result of the bile being absorbed into the blood. It is not a disease, but a symptom of disorder of the liver, or a plugging of the bile duct. The nose, lips and eyes will be yellowish instead of the pale pink color of health; the urine is

saffron-colored; the excrement dirty gray in color; and generally constipation is present.

What to Do. Endeavor to get rid of the excess of bile in the system, and this is best accomplished by giving purgatives that act on the liver. Calomel, two drams; with aloes, seven drams should be given. Glauber salts in handful doses, once or twice a day for a week is also effective. May-apple (podophylin), rhubarb, castor oil, and other cathartics that act upon the first or small bowels, may be given. Avoid hard, dry, bulky foods and see that the bowels are kept open.

Gall-Stones, or Biliary Calculi. These are rarely found in the horse, but occasionally they occupy the hepatic ducts, giving rise to jaundice and colicky pains. There are no symptoms by which gall stones can be positively determined; but if a horse has repeated symptoms of wind colic, accompanied with violent pains, and that during or following these attacks there is evidence of jaundice, a good guess is that the animal has gall-stones. There is not much that can be done except to give medicine to overcome pain, and trust that these formations may pass out of the ducts into the bowels, where they will not occasion any trouble, on account of their small size.

INTESTINAL WORMS.

Description of the Common Kinds. Although there are several kinds of worms found in the intestines of horses, it will be sufficient to refer to three or four of the most common ones. Weak and debilitated and young horses are most frequently afflicted.

Lumbricoid. This is a worm four to twelve inches in length, although some have been seen over thirty inches long. In form it is much like the common earth-worm (fish-worm). These worms are white or reddish in color, and vary in thickness from a wheat straw to a lady's finger, being thickest at the middle and growing smaller toward both ends. They are found singly and in groups, and live chiefly in the small intestines.

Pin-Worm. This is a very common variety of worm and they are found mostly in the large intestines. They are semi-transparent; thread-like in form; and measure from one to two inches in length.

Tape-worm. This is a white, flat, thin, broad, jointed worm. The head is found at the smaller end of the worm. Tape-worms of the horse sometimes measure from twenty to thirty feet in length.

Symptoms of Intestinal Worms. Slight colicky pains at times are noticed or there may be only switching of the tail; frequent passages of manure; slight straining; itching of the anus; and rubbing of the tail or rump against the stall or fence. The horse will be in poor condition; does not shed his coat; is hide-bound and pot-bellied; the appetite is depraved, licking the walls; biting the wood-work of the stalls; licking parts of his body; eating the ground; and very fond of salt. The bowels are irregular, constipated, then diarrhea being noticed. Some place much dependence on the itching of the upper lip, as shown by the horse frequently turning it up and rubbing it upon the wall or stall. The one symptom, that should always be looked for, and one that will not deceive, is seeing the animal pass the worms in the excrement.

How to Expel Worms. Remedies to destroy worms are most effective if given after a long fast, and then followed by a physic to carry off the worms. The best worm medicines are santonine, turpentine, tartar-emetic, infusion of tobacco, and bitter tonics. To destroy tape-worms, areca nut, male-fern. and pumpkin seeds are best. If the long round worms are being passed, give twice daily, for three or four days, a drench composed of turpentine, one ounce and linseed oil, two or three ounces, to be followed on the fourth day by one ounce Barbadoes aloes.

If pin-worms are seen, use injections into the rectum, of infusions of tobacco or infusion of quassia chips one-half pound to a gallon of water, once or twice daily for a few days, and follow by a physic. Remember intestinal worms are mostly seen in horses that are in poor condition; and an important part of our treatment is to improve the appetite and powers of digestion. This is done by giving the vegetable tonics. One-half ounce of Peruvian bark, gentian, or quassia is to be given in the food twice a day. Unless the system is toned up, the worms will rapidly accumulate again, even though they may all seem to have been expelled by the worm medicine.

CLASSIFICATION OF THE CAUSES THAT PRODUCE THE VARIOUS KINDS OF COLIC.

Whenever a horse presents symptoms of abdominal pain (pawing, lying down, rolling, etc.) it has been the custom from time immemorial to call it colic. As a great number of different diseased conditions in the abdominal cavity cause such symptoms the treatment should therefore be varied.

Many of these diseases of course cannot be clearly differentiated during life, although we are able to notice characteristics which are in a measure peculiar to certain diseased conditions which enable us to make a positive diagnosis.

The statistics show that ten to twenty per cent. of horses affected with colic die, and that forty per cent. of the deaths of horses are due to this trouble.

Certain medical compounds have been put upon the market as specifics for colic. This is what makes the treatment of colic unsatisfactory and increases the mortality. The classification of the causes of colic is as follows:

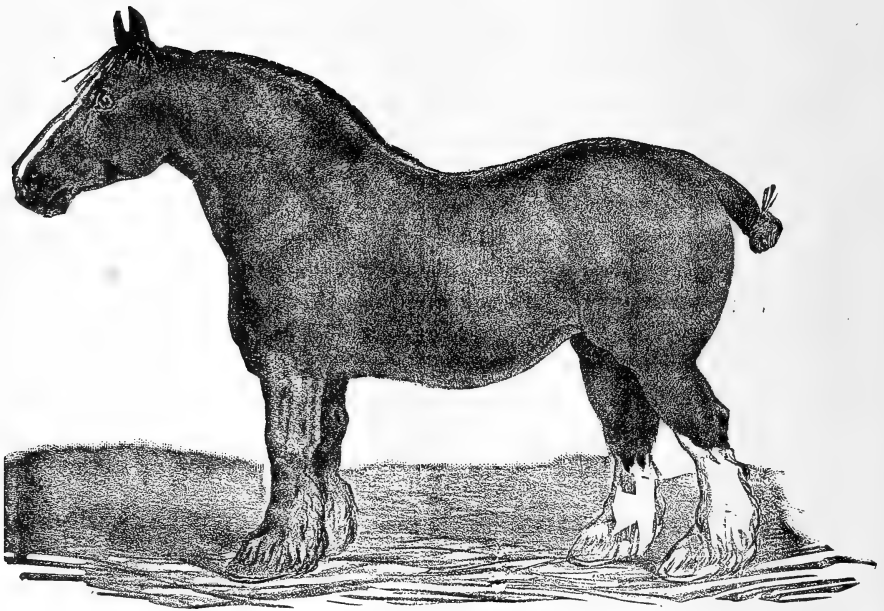
- 1st. Food colic.
 - (a) Over feeding colic.
 - (b) Colic due to damaged or improperly prepared food.
 - (c) Starvation colic.
- 2d. Colic caused by obstruction to the gut.
 - (a) Colic due to impaction of dried, woody food in the large intestine of adult horses. The retained uncomium or the ingested straw and hay of the foal.
 - (b) Mechanical obstructions, such as twisted gut, intussusception, rupture, and tumours.
- 3d. Colic due to paralysis of the intestine.
- 4th. Colic due to plugging of the blood vessels of the intestines. (Thrombosis and embolism).
- 5th. Nervous colic, due to exposure, fatigue and other causes. (Spasmodic colic).
- 6th. Colic due to worms.
- 7th. Colic due to foreign bodies in the intestines, such as stones (calculi), sand or dirt.

The chief danger is the accumulation of gas from which relief should

be given promptly and practically as possible, for the following reasons:

- 1st. To avoid rupture of the stomach, intestine, and diaphragm.
- 2d. To prevent suffocation.
- 3d. To prevent the effect of the absorption of gases.
- 4th. To permit healthy intestinal movement and prevent paralysis.
- 5th. To relieve pain.
- 6th. To prevent intestinal displacement.

The most prompt and safe way to remove gaseous distention is to use trochar and canula, and plunge this into the highest part of the right flank. This of course should be done by a skillful veterinarian.



SHIRE MARE, "BLOSSOM II."

THE PROPERTY OF THE EARL OF ELLENBOROUGH, WORSLEY HALL, MANCHESTER. BREED BY JOHN BOPPER, NORTHSIDE, WEAVERHAM.

CHAMPION MARE AT SHIRE HORSE SHOW, LONDON, 1888.

CHAPTER V.

RESPIRATORY ORGANS,

Their Diseases and How to Cure Them.

DESCRIPTION OF ORGANS OF THORACIC CAVITY, DISEASES OF THE NOSTRILS, THE NASAL CHAMBERS, THE SINUSES, THE PHARYNX, THE LARYNX, THE WIND-PIPE, THE BRONCHI, THE BRONCHIAL TUBES, AIR-CELLS, PLEURA, AND DIAPHRAGM.

RESPIRATORY organs are those that are used for, or aid in breathing. Some of the organs are used almost entirely in the process of breathing, while other serve a double function. The taking or drawing in of the air into the lungs is called inspiration. The side walls and front of the chest move upward and outward forming a vacuum and the air rushes in to fill the cavity. The sending of air out of the lungs is called expiration. This is ordinarily accomplished by the weight of the chest, which sinks down, displacing the air.

Description of the Respiratory Organs. The organs aiding in respiration may be classed as follows:

NOSTRILS—the nasal openings, the place where the skin gradually changes to mucous membrane;

NASAL CHAMBERS—the cavities through which the air passes to the head. These chambers are completely separated, the right from the left, by partitions of cartilage;

SINUSES—the compartments which communicate with the nasal chambers and are lined with a continuation of the same membrane;

PHARYNX—the back part of the mouth and above the first rings of the gullet. It is common to the functions of respiration and digestion;

LARYNX—the complicated structure situated at the top of the wind-pipe, and just back of the root of the tongue. It may be considered a box which opens into and is continuous with the wind-pipe:

WIND-PIPE OR TRACHEA—the air tube consisting of rings of cartilage which extends downward from the larynx to opposite the fourth or fifth dorsal vertebra;

BRONCHI—the two parts into which the wind pipe divides. The one going to the right lung is called the right bronchus, the one to the left lung is the left bronchus;

BRONCHIAL TUBES—the division of the bronchi which penetrate and carry air to all parts of the lungs;

AIR-CELLS—the small recesses at the end of the bronchial tubes. These are separated from each other by a delicate membrane, between the layers of which lies the plexus formed by the pulmonary artery. The blood is thus exposed to the air on two surfaces;

LUNGS.—the bronchial tubes, the air-cells and plexus together make up what is commonly called the lungs. There are two divisions, one on the right and the other on the left;

PLEURA—the thin double membrane that surrounds the lungs. One layer of this membrane is attached to the lungs, the other to the chest wall. This membrane secretes a fluid to lubricate their surfaces as they move one upon another;

DIAPHRAGM.—the muscular division which separates the heart, lungs, and large blood vessels from the stomach, liver, and intestines. It is the muscle of inspiration.

Causes of Diseases of Respiratory Organs. These organs are more liable to disease than the organs connected with any other functions of the body, and as nearly all are the results of carelessness it is well to know and study causes. In the spring and fall when animals are changing coats, there is a tendency to contract disease, and care should be taken at these periods to prevent other exciting causes.

Avoid badly ventilated stables.

Avoid taking horse from pasture and putting in too warm a stable.

Avoid cold, close, damp stables as well as hot, close, and foul ones.

Avoid changing from a hot to a cold stable.

Avoid stables not well ventilated or not well cleaned.

Avoid allowing an overheated horse to dry by letting the hair dry by evaporation. Rub the horse dry.

Avoid letting a horse (especially if warm or covered with sweat) stand in a draught. Walk the horse till cool.

Avoid prolonged or fast work, when animal is out of condition.

Avoid leaving horses, that have been out in cold rains, to dry by evaporation. Rub them dry.

Avoid leaving on horse blankets that have become moist from the sweating animal. Take them off and put on dry ones.

DISEASES IN THE HEAD.

Catarrh or Cold in the Head. Catarrh means a discharge of fluid from the mucous membrane. Catarrh is at first a congestion followed by inflammation of the mucous membrane lining the nasal cavities. It usually extends into the sinuses of the head, and sometimes to the membranes of the larynx and pharynx, causing sore throat. The nasal duct which leads from the eyes to the nose is lined with the same membrane, and often the congestion and inflammation extends to the eyes as shown by their redness and flowing of tears.

Symptoms. The mucous membrane is at the beginning of the attack, dry and congested; much deeper pinkish-red or red than natural; then a watery discharge makes its appearance; the eyes may become affected, and tears flow on the cheeks. The animal has some fever which may be easily detected by placing the finger in the mouth, as the feeling of heat coming to the finger will be greater than the natural; the animal may be dull; frequently emitting a sort of sneezing snort, but does not cough unless the throat is affected; very often forces air through his nostrils as if he was "blowing his nose." A few days after the attack the discharge changes from a watery to a mucilaginous state, and is of a yellowish-white color.

NOTE.—To become quite expert in ascertaining the changes of temperature in the horse, it is only necessary to place the finger often in the mouths known to be healthy.

How to Cure. This disease is not serious, but if left to go its own way, it may run into a dangerous complication and should receive prompt attention. Have the horse inhale steam about fifteen minutes at a time, four or five times a day, as suggested under MANAGEMENT

AND CARE. Pay particular attention to the diet. Feed bran mash,es, scalded oats, linseed gruel, and grass if in season. If constipation appears, relieve the animal by injections (enemas) of warm water into the rectum, three or four times a day. But under no circumstances give physic.

To simple cases the above is all that is necessary, but if appetite is gone and the animal appears dull, give three times a day three ounces of the solution of acetate of ammonia and two drams of powdered chlorate of potash, diluted with a pint of water.

When the inflammatory symptoms subside and the appetite does not return give two ounces each of the tincture of gentian and spirits of nitrous ether in a pint of water as a drench, every night and morning for several days. If after ten days the discharge continues, give one dram of powdered sulphate of iron three times a day.

Chronic Catarrh. This is an inflammation of some part of the membrane affected by a common cold which has become persistent. The sinuses of the head are the usual seats of the trouble, and it is manifested by a more or less continuous discharge of a thick, white or yellowish-white matter from one or both nostrils.

Symptoms. The long-continued discharge just mentioned will invariably indicate the disease. Exercise great caution in examining these cases to distinguish them from glanders. This disease is neither dangerous nor contagious, although at times it is difficult to cure. The discharge may be irregular, quite large quantities being discharged at times, while at others scarcely any.

Treatment. The animal should have nutritive food and regular light exercise. The food should be placed in a box on the ground, and the hay where the head must be lowered to eat it. For eight days give one of the following powders night and morning; sulphate of iron, three ounces; powdered nux vomica, one ounce; mix and make into sixteen powders. Then for the next eight days, give night and morning one of the following: sulphate of copper, four ounces; powdered gentian, six ounces; mix and divide into sixteen powders. After this give one dram of iodide of potassium dissolved in a pail of drinking water, one hour before each meal. A blister over the face is often of much benefit. The ordinary fly blister plaster of the drug store mixed with one-third its weight of lard is very efficient. As a disinfectant sprinkle chloride of lime about the stall, and a small quantity may be placed in the manger under the hay.

Inflammation of the Pharynx. In the back part of the pharynx is the canal through which the food and water pass to the stomach. Inflammation of the pharynx is a complication of other diseases, viz: influenza, strangles, etc., and is probably more or less complicated with inflammation of the larynx. The treatment is the same as for inflammation of the larynx, which is next described.

Laryngitis or Sore Throat. The mucous membrane lining the larynx is so highly sensitive that the smallest particle of food, which happens to drop into it will cause it to contract and violent coughing ensues, which is continued until the foreign matter is ejected. Inflammation of the larynx is a serious and sometimes fatal disease and as before stated, is usually complicated with inflammation of the pharynx, constituting what is generally known as "sore throat."

Symptoms. A cough is first noticed followed by the difficulty in swallowing. In many cases the difficulty in swallowing is so great that the water, and occasionally the food, is returned through the nose. The mouth is hot and saliva dribbles from it. The glands between the lower jaw bones and below the ears may be swollen. Pressure on the larynx induces a violent fit of coughing. The head is more or less "poked out;" membrane in the nose becomes red; discharge from nostrils soon appears. As the disease advances, the breathing may assume a more or less noisy character; sometimes a rasping snore is given with each breath; and the breathing becomes hurried.

How to Cure Sore Throat. In all cases steam the nostrils as advised for "cold in the head" or catarrh. In bad cases keep up the steaming for hours, or until relief is gained. Have a fresh bucketful of boiling water every fifteen or twenty minutes. In each bucketful of water put a tablespoonful of oil of turpentine, which will be carried along with the steam to the affected parts. In mild cases, steaming the nostrils every two hours will suffice.

The body should be blanketed, and bandages applied to the legs. The feed should consist of soft food, such as, bran mash,es, scalded oats, linseed gruel, and grass if in season. Fresh water should be before the animal all the time. Constipation (if it shows itself) must be relieved by injections of warm water three or four times every twenty-four hours.

A liniment made of olive oil, two ounces; solution of ammonia, one ounce; and tincture of cantharides, one ounce; should be thoroughly rubbed-in, about the throat from ear to ear, and about six inches down

over the windpipe and in the space between the lower jaws. Apply this liniment once a day for two or three days.

If the animal can swallow without much difficulty, give the following as a drench, to be repeated every six hours: fluid extract hyoscyamus, one dram; powdered chlorate of potash, two drams; molasses, two ounces.

Should great difficulty be experienced in breathing, do not attempt to give drenches, but persevere in steaming the nostrils, and dissolve two ounces of chlorate of potash in every gallon of water given. Even if this is not swallowed and returned through the nose it will be of benefit as a gargle to the pharynx.

If breathing begins to be loud, relief is sometimes afforded by giving as a drench two ounces of jaborandi in half a pint of water. If this benefits, repeat the dose five hours after the first. This will cause a free flow of saliva from the mouth within a half hour.

Roaring This is caused by an obstruction to the free passage of the air in some parts of the respiratory tract. This is really a symptom of some ailment and not a disease of itself. There are many causes that may induce temporary, intermitting or permanent noisy breathing; but in nine out of every ten cases of chronic roaring, the cause is paralysis of the muscles of the larynx. A skilled veterinarian who is able to determine the cause of the trouble, may be able to benefit, but the result is doubtful.

NOTE.—An animal that is a roarer should never be used to breed from, no matter how valuable the stock. This taint is transmittible, and the offspring is born with a predisposition to this trouble.

High Blowing. This is a noisy breathing that is decidedly a nasal sound, and must not be confounded with "roaring." The sound is produced by the action of the nostrils. This is a habit and not an unsoundness. In "roaring" when the animal is put to severe exertion the sound increases, in "high blowing" the sound ceases.

Whistling. This is one of the sounds made by a "roarer" and therefore needs no further notice, except to state that this sound may be made during an attack of severe "sore throat" and will pass away with the disease that causes it.

Thick Wind. This is another term which is applied to a disease, which is only a symptom. The great majority of horses called "thick winded" belong either to the "roarers" or have the "heaves." Occasionally a mare heavy with foal, or horses excessively fat are affected

with heavy breathing that may be called "thick wind." In the one nature will cure; while in the other there is needed a light diet that will lessen the fat, and plenty of exercise.

Guttural Pouches. There are two sacks not included in the organs of respiration, that are near the pharynx and larynx. They are peculiar to solipeds and their use is unknown. In health they contain air, but sometimes pus collects in them, causing considerable interference with respiration,

Symptoms. Swelling on the side below the ear and an intermittent discharge of matter from one or both nostrils, especially if head is lowered. The swelling is soft, and if pressed upon, matter will escape from the nose, if head is lowered.

What to Do. Turn the animal out to grass or feed from the ground. In addition give the tonics recommended for "nasal gleet" or as it is more properly called chronic catarrh.

DISEASES WITHIN THE CHEST.

How to Detect the Diseases Within the Chest. It is necessary to study the horse in health, as to pulse and respiration, to be able to distinguish the change so as to recognize disease. Study carefully the MANIKIN OF THE HORSE, so as to be able to locate the organs.

Where to Take the Pulse. By this is meant the beating of the arteries which correspond in number and character to the beating of the heart. The artery usually selected for "taking the pulse" is the submaxillary artery where it winds around the lower jaw-bone. On the inner side of the jaw-bone the artery may be readily felt and to "take the pulse" should be pressed against the bone. The number of beats in a minute; the regularity or irregularity; the strength or feebleness; and other peculiarities may be easily noted.

Number of Pulse Beats per Minute. In the healthy horse the average number of beats in a minute is about forty. But in different horses will vary from thirty-five to forty-five. In the low-breed large lazy horse it will not be more than thirty-five, while in the highly-bred nervous animal it may reach forty-five. Work and excitement increase the number of pulsations. If the pulse of a horse be taken while standing quietly in the stable, it will be less frequent than when at pasture

Peculiarities of the Pulse. A little study of the following will aid much in the determination of the various peculiarities of the pulse. If the pulse beats fifty-five or more times in a minute while the horse is at rest, it is an evidence that fever is present.

FREQUENT PULSE—is one that beats an increased number of times in a minute.

INFREQUENT PULSE—is the reverse.

QUICK PULSE has reference to the time occupied by each separate pulse. The beat may strike the finger either quickly or slowly. The pulse may beat forty quick pulsations in a minute, or forty slow ones.

INTERMITTING PULSE—is one in which a beat is occasionally omitted. The beat which is omitted may come at the end of some given number of pulsations, when it is called regularly intermittent.

LARGE PULSE—is one that seems to feel fuller and seems to strike the finger over a larger space than usual.

SMALL PULSE—means the opposite.

FEEBLE PULSE—is one in which the artery is easily pressed down and conveys the idea of emptiness.

HARD PULSE—is one that causes the feeling of hardness or resistance. The artery feeling full and the pulse beating with force;

DOUBLE PULSE—is one in which the beat seems to give two rapid beats at once.

The pulse may include the character of two or more of the foregoing classes. Thus a horse may have a quick, intermitting, feeble pulse, etc.

Temperature. The temperature of the healthy horse is slightly above that of man, ranging from $99\frac{1}{2}^{\circ}$ to $101\frac{1}{2}^{\circ}$ F. The average is about 100° F. High surrounding temperature and exercise as well as digestion will increase the animal temperature. The most accurate way of taking temperature is by introducing a self-registering thermometer into the rectum. The thermometer should remain in three or four minutes before it is removed.

Respiration. The character of breathing is much changed by disease. These peculiar characteristics are very essential in determining the location and nature of a disease.

Respirations Per Minute. In health, standing quiet, the horse breathes from twelve to fifteen times a minute; work or excitement increases the number.

Kinds of Respiration. The following terms are used in explaining the various characteristic breathings.

QUICK BREATHING—refers to an increased number of respirations per minute, which may be due to exercise or disease.

DIFFICULT BREATHING—is always the result of something abnormal, and it is often a perfect guide to the trouble.

STERTORIOUS BREATHING—is not to be confounded with difficult breathing. It is more of a snore-like breathing, and is due to a relaxation of the palate, and not to disease of this part. It is generally associated with brain disease, when the consequent derangement of the nervous functions causes the relaxation of the soft palate.

ABDOMINAL BREATHING—is when the ribs are kept nearly stationary, and the abdominal muscles assist in breathing to a greater extent than is natural. The "belly" is seen to work like a bellows. In pleurisy, owing to the pain caused by moving the ribs, abdominal breathing is always present.

THORACIC BREATHING—is the opposite of abdominal breathing, that is the ribs rise and fall more than usual, while the abdomen remains fixed. This is due to abdominal pains, such as peritonitis, etc.

IRREGULAR BREATHING—is shown to good advantage in heaves, and often in acute diseases during their critical stage.

Secretions. During the first days of an inflammatory disease notice carefully the secretions. In a common cold, there is first dryness, then watery discharge, followed by thick mucus. In pleurisy the membranes are at first dry, which can be easily determined by putting the ear against the chest over the affected part and there will be heard the dry rubbing sound, like two pieces of paper rubbing one against the other.

Cough. The surface being congested there is usually an effort as if to remove some source of irritation in the respiratory track.

The **DRY COUGH** is heard during the first stages of a disease of the respiratory organs. In pleurisy the cough is a dry one, and the animal tries to suppress it.

The **MOIST COUGH** is heard when the secretions have been re-established. Cough is but a symptom—the effect of a disease. Roaring, heaves, pleurisy, and pneumonia have each a cough peculiar to the affection.

Detecting Disease by Sound. Auscultation is the term applied to the detecting of diseases of the organs within the chest by

listening to the sounds. Generally the ear is placed directly against the part but occasionally an instrument called the stethoscope is used. The ear is best for horses. First, get accustomed to the sounds in a healthy horse, which can be done by practice only. Then more patience and practice with your sick animals and you will be able to distinguish signs of disease and their indications.

Percussion. This term in the practice of medicine means striking some part of the body to determine the condition of the internal organs. If the wall of a cavity is struck the sound is easily distinguished from that emitted when a solid substance is knocked upon. This method of examination requires practice with the healthy as well as with the unhealthy animal.

Bronchitis. This is an inflammation of the bronchial tubes. The mucous membrane lining the tubes may alone be affected or it may extend to the whole structure. When confined to the largest tubes it is less serious than when the smaller ones are affected.

Symptoms. The animal appears dull; appetite wholly or partially lost; head hangs; the breathing is much quickened; the cough, at first dry, and having somewhat the character of a "barking cough" is succeeded in a few days by a moist rattling cough; the mouth is hot; the visible membranes in the nose are red; the pulse frequent, hard, and quick in the first stages, but as disease advances becomes smaller and more frequent. In a few days a whitish discharge from the nostrils, which may be tinged with blood may make its appearance. The ribs rise and fall more than is usual, which proves the animal has not the pleurisy. The horse persists in standing throughout the attack. Urine decreased in quantity and darker in color than usual.

Bronchitis affecting the smaller tubes is one of the most fatal diseases, while that of the larger is never serious. It is an extremely difficult thing for the non-expert to discriminate between the two forms, and also he will have difficulty in distinguishing between bronchitis and pneumonia.

Treatment. Put animal in well ventilated box-stall. Cover body with blanket. Hand rub legs till warm, then apply flannel bandages from hoof to knees and hocks. If the legs cannot be made warm by rubbing apply liniment recommended for "sore-throat." Rub in thoroughly and then put on bandages. Rub the same liniment over side of chest, and that part of the side occupied by the lungs as indicated by the MANIKIN OF THE HORSE. Repeat application to

the chest in about five days. If applied oftener it will be apt to irritate the animal too much and make him restless.

Compel animal to inhale steam. In each gallon of water put a table-spoonful of oil of turpentine. In serious cases give steam every hour, and in any case the oftener it is done the greater will be the benefits. Three times a day, give as a drench; solution of acetate of ammonia, three ounces; spirits of nitrous ether, two ounces; bicarbonate of potassium, one-half ounce; water one pint. Care must be used in drenching. If it makes animal worse, don't persist, but give instead one-half ounce of bicarbonate of potassium in every bucketful of water the animal will drink. Keep cold water before him all the time.

If the horse is prostrated and has no appetite, give the following drench: spirits of nitrous ether, two ounces; rectified spirits, three ounces; water, one pint. Repeat dose every four or five hours, if it appears to benefit.

If the horse is hard to drench give the following ball: pulverized carbonate of ammonia, three drams; linseed meal and molasses sufficient to make the whole into a stiff mass; wrap it with a small piece of tissue paper and it is ready to give. This ball may be repeated every four or five hours. Do not let this ball break in the mouth as it will make the mouth sore, and prevent the animal from eating.

If constipated give enemas of warm water. Do not bleed the animal.

When the symptoms have abated and nothing remains of the disease except the cough and a white discharge from the nostrils, all medicines except the following tonic treatment should be discontinued. Give the following mixture: pulverized sulphate of iron, three ounces; powdered gentian, eight ounces; mix well together and divide into sixteen powders. Give a powder every night and morning mixed with bran and oats if the animal will eat it, or shaken with about a pint of water and administered as a drench.

If cough remains for so long a time as to lead you to think it will become chronic, say three or four weeks after the horse is apparently well, apply the liniment above recommended to the throat and well over the wind-pipe and breast. Also give one dram of iodide of potassium dissolved in a bucketful of drinking water, one hour before each meal for two or three weeks if necessary.

Chronic Bronchitis. This is due to same causes as the acute form, or may follow it. Chronic bronchitis may change into the acute form by a very slight cause. Its course is slower, less severe, and not

accompanied with as much fever as acute. The general symptoms are the same and the non-expert is apt to say, "the horse has a touch of bronchitis;" but as the animal does not improve he at last is forced to commence treatment.

What to Do. Do not work the animal. Rest is necessary if a cure is desired. Give the same general treatment prescribed for the acute form. If the animal is not benefitted to a marked degree, give the following: powdered nux vomica, three ounces; powdered arsenic, seventy grains; powdered sulphate of copper, three ounces; mix together and divide into thirty-six powders. Give a powder mixed with bran and oats every night and morning.

If all other treatment fails, try the following: hydrocyanic acid (Sheller's strength), twenty minims; nitrate of potassium, three drams; bicarbonate of soda, one ounce; water, one pint. This dose should be given every morning and evening for one or two weeks, if necessary.

Congestion of the Lungs. Inflammation of the lungs is always preceded by congestion, or we may say congestion is the first stage of inflammation. Congestion is an excess of blood in the parts affected. Congestion may exist as an independent affection, and is generally caused by over-exertion when the animal is not in a fit condition to undergo more than moderate exercise.

Symptoms. If the animal is taken ill on the road, he will slacken his pace, show a desire to stop, and may stagger and even fall. The nostrils will be dilated; the flanks heaving; the countenance haggard; and every other appearance of suffocation will be evident. If the symptoms do not appear until returned to the stable the horse will be found with his head down; legs spread out; eyes wildly staring or dull and sunken; breathing rapid and almost gasping; body covered with sweat, which may soon dry, leaving legs and ears cold; breathing both thoracic and abdominal; the chest rises and falls and the flanks are powerfully brought into action. If pulse can be felt at all, it will be very frequent, often reaching one hundred or more a minute. The animal may tremble all over, and if the ear is placed against the side of chest, a loud murmur or perhaps a fine crackling sound will be heard.

Treatment. If taken on the road, do not attempt to return to the stables. If in the stable give plenty of pure air. If weather is warm, open air is best. Let the animal stand still; he has all he can do to get enough pure air to sustain life. If possible set three or four men at

work, rubbing body and legs, until the skin feels natural. Do not let the men stop short of a good vigorous rubbing.

Rub over the cold part of the legs the same liniment used in bronchitis, but do not put it on the chest.

The medicines needed are diffusible stimulants. Give two ounces each of spirits of nitrous ether and alcohol, diluted with a pint of water, every hour till relief is afforded. But if it takes too long to get this medicine, give a quarter of a pint of whiskey in a pint of water every hour, or the same quantity of brandy. An ounce of tincture of arnica in a pint of water every hour for four or five hours, may be used, if the last can not be obtained.

If none of these remedies are at hand give two ounces of oil of turpentine, shaken with a half pint of milk. This will be of benefit till the better remedies can be obtained. A tablespoonful of aqua ammonia (hartshorn), diluted with a pint of water, and given every hour, may be of service in saving life when nothing else can be obtained in time.

Great care must be used after the animal has commenced to improve, as this disease may be followed by pneumonia. Provide comfortable stall, avoid draughts, and keep the animal blanketed and legs bandaged.

Apoplexy of the Lungs. This is another term for congestion of the lungs. When there is bleeding from the lungs during their congested state it is called PLUMONARY APOPLEXY.

Pneumonia or Lung Fever. This is an inflammation of the lungs, in which the air cells are the parts principally affected, although the minute branches of the bronchial tubes are always inflamed to a greater or less degree.

Symptoms. The first symptoms of pneumonia when a primary disease, is a chill, more or less prolonged, which in most cases is overlooked, or not seen. The breathing becomes more rapid; the animal hangs his head and has a very dull appearance; the mouth is hot and has a sticky feeling to the touch; the heat conveyed to the finger, indicates fever; if thermometer is used, the temperature will be found to reach 103° F., or higher; pulse beating from seventy to one hundred or more per minute; character of pulse varies very much, it may be hard or feeble, large or small, intermitting, etc. There is usually a dry cough from the beginning, which changes in character as the disease advances; if pleurisy sets in the cough will be peculiar to that affection, that is, cut short in the endeavor to stop it.

The appetite is usually poor, but the desire for water is greater, par-

ticularly at the beginning of the disease. The legs are cold; the bowels more or less constipated; the passages being covered with a slimy mucus.

Treatment. The general treatment is the same as for bronchitis. Give animal plenty of fresh, cold drinking water. Blanket the body. Rub legs till warm, then put on bandages from hoof up as far as they are cold. If hand-rubbing does not make legs warm, put on liniment recommended in the treatment of bronchitis. At least twice a day the bandages should be removed and the legs well rubbed, and bandages again applied.

Over the affected side apply the liniment recommended for "sore-throat," and if necessary it may be repeated after five days. Do not use mustard. Do not clip off the hair and rub in powerful blisters. Hot applications to the side of the chest are beneficial if the articles necessary to use to apply them are handy. Do not use aconite. Do not give physic. If the animal is constipated, relieve it by an allowance of laxative food, such as scalded oats, bran and linseed mash, and grass in season. If this does not relieve, give an injection of about a quart of warm water three or four times a day. If the animal has no desire for this food, let him eat anything that he cares for. Make hay tea by pouring boiling water over good hay into a bucket and allow to cool. Remove the hay and allow to drink as much as desired. If the animal will drink milk, it may be supported for days, by giving three or four gallons of sweet milk, into which may be stirred three or four fresh eggs to each gallon of milk.

The following drench should be administered every six hours: solution of acetate of ammonia, three ounces; spirits of nitrous ether, one ounce; bicarbonate of potassium, three drams; water, one pint. Use great care in drenching.

If the horse gets very much weakened, use stimulants of a more pronounced character, as follows: rectified spirits, three ounces; spirits of nitrous ether, two ounces; water, one pint. If benefit is derived repeat every four or five hours. Or give six ounces of whiskey with a pint of water instead.

When animal improves and the fever has left, give the tonic medicines advised in bronchitis.

Pleurisy. This is an inflammation of the double membrane (the pleura) which surrounds the lungs. In health this membrane moves upon itself with every breath, and secretes a fluid (called serum) for

lubricating its walls. This keeps the surfaces always moist and smooth. In pleurisy the membrane first becomes congested, the surfaces getting dry and roughened. This dry condition is followed after a time by the membrane throwing off more fluid than usual. This fluid accumulates in the space between the lungs and the walls of the chest, causing "dropsy of the chest" or hydro-thorax.

Symptoms. This disease usually commences with a chill, which is often overlooked. The animal does not move or turn around. When compelled to do so, he grunts or groans with pain. The animal stands stiff; the ribs are fixed, that is has abdominal breathing; both fore-feet and elbows may be turned out; the animal may be restless, and act as if he had a slight colic; may lie down, but does not remain long.

After the membrane begins to secrete the excessive fluid mentioned above, a furrow will be found running along the lower part of the chest, from behind the elbow to the flank; this is due to the endeavor of the animal to keep the ribs fixed in as near as possible an unmovable position. Every movement of the chest causes severe pain, therefore the cough is peculiar; it is short and comes as near no cough as the animal can make it.

The breathing is hurried, the mouth hot, the temperature being raised from 102° or 103° to 105° F. The usual fever symptoms, such as costiveness, and scanty and dark-colored urine are present. The pulse is frequent, perhaps seventy or more a minute, and is hard and wiry.

If the ribs are struck with the knuckles, there will be some spot, more or less extended where the blows cause more or less pain. The animal may grunt or groan every time it is struck. By listening at the side you will come to a place where there will be distinguished a sound very much like that produced by rubbing two pieces of coarse paper together. In many cases the friction is so great that it can be felt by placing the hand over the diseased part. When the dry state is succeeded by the secretion of fluid, the sound disappears.

If the quantity of the fluid is large, the large amount retards the process of absorption to a great extent. In some cases the symptoms manifest a serious state. The pulse becomes more frequent; the breathing more hurried and labored; flanks work like bellows; the nostrils flap; the eyes stare wildly; countenance expresses anxiety; and general signs of breaking up are plain. After a short time swellings appear under the chest and belly and down the legs. Pleurisy is most often confined to the right side.

Treatment. This is quite similar to the treatment of bronchitis and pneumonia, but as pleurisy is so apt to be complicated with either of these diseases the treatment may be considered as merely an addition to the treatment for these ailments. The hot applications applied to the chest as suggested in the treatment for pneumonia are very beneficial, and should be kept up while the symptoms show the animal to be in pain.

The liniment should not be applied till the symptoms of pain, have somewhat subsided, then rub it well over the affected part. Apply every other day till several applications have been made. From the beginning the following drench should be given every six hours: solution of the acetate of ammonia, three ounces; spirits of nitrous ether, one ounce; bicarbonate of potassium three drams; water one pint.

If the pain seems very severe in the beginning of the attack, causing the animal to lie down or paw; give the following drench; tincture of opium, two ounces; raw linseed oil, twelve ounces. If the pain continues the opium may be repeated after four hours.

Should the case after ten or twelve days not progress favorably, it is due to the excessive fluid not being absorbed; hence effort must be made to excite absorption. Apply the liniment over the lower part of both sides and the bottom of the chest, and give the following drench three times a day, for a week, if it appears necessary and of benefit; tincture of perchloride of iron, one ounce; tincture of gentian, two ounces; water one pint. Also give one dram of iodide of potassium dissolved in the drinking water one hour before feeding, every night and morning for a week or two.

If tapping of the chest is necessary it should be done, before the strength of the animal is lowered beyond recovery, and it is best to call a veterinary to perform the operation.

Pleuro-Pneumonia. When an animal is affected with pleurisy and pneumonia combined, which is often the case, it is called PLEURO-PNEUMONIA. At the beginning only one of the affections may be present, but the other soon follows. The symptoms of both diseases are present, but usually that of pleurisy, is the most prominent. The course of treatment is the same as recommended for pneumonia and pleurisy when they occur repeatedly. Then symptoms of both diseases are present, but usually that of pleurisy is the most prominent. The course of treatment is the same as recommended for pneumonia and pleurisy when they occur separately. The symptoms will be the guide whether it is

best to give laudanum and oil for the pain if the pleurisy is very severe. Do not give it unless absolutely necessary to relieve the pain.

Broncho-Pleuro-Pneumonia. This is the name given when bronchitis is present with pleurisy and pneumonia. It is not a common occurrence. It is impossible for a person not an expert to determine this combination with certainty, as the apparent symptoms are the same as a pleuro-pneumonia.

Broncho-Pneumonia. This is a common complication. Either the bronchitis or the pneumonia may be first. The treatment is the same as for the diseases when separate.

Heaves—Broken Wind—Asthma. The popular mind is much confused with regard to the nature of "heaves." Many horsemen apply this name to all ailments when the breathing is noisy or difficult. This disease is thought to be due to spasm of the small circular muscles that surround the bronchial tubes. This continued affection leads to a paralysis of these small circular muscles, and is thought to be one of the first stages of the disease. There is good foundation for the opinion of some eminent veterinarians, that the cause of this trouble is due to a lesion of the pneumo-gastric nerve. This trouble is always, connected with some disorder of the digestive organs.

How to Know the Heaves. Nearly every experienced horseman is able to detect this disease. The cough which is present in this disease is peculiar; the sound is short, and something like a grunt. When the air is drawn in, it appears to be done in the same manner as in health, but when expelled, the lungs having lost most of their power of contracting, the great change in breathing is then very plainly seen. The abdominal muscles are brought into play; those about the flank contract, then pause a moment, then complete the act of contracting, thus making a double bellows-like jerky motion with every breath. A wheezing noise is heard when the animal is exerted, and the same can be heard to a less degree when the animal is at rest, if the ear is put against the chest.

Indigestion is always present; the animal has a depraved appetite, often eating dirt and soiled bedding instead of the clean food in the manger; they often overload the stomach; the animal often gets "pot-bellied;" wind of an offensive odor often passes: attacks of colic may occur and they are usually fatal; the bowels are often loose; and the animal can not perform much work, as the muscles are soft. Never let a day go by without giving light exercise.

What to Do. When this disease is once settled there is no cure for it. The treatment must be such as to relieve the symptoms, which are ready to return any time, if the animal overloads the stomach or is given food of a bad quality. Proper attention to the food is necessary. Clover hay and bulky food generally have much to do with the cause of the disease, and therefore should be omitted. Moldy or dusty hay, or fodder of any kind is very injurious. Hay should be fed only once a day, and then only in small quantities. Always water before feeding; never directly after; slightly dampen hay, fodder, and oats to allay the dust; do not work the animal under an hour after a meal; turning to pasture gives relief; carrots, potatoes, or turnips chopped fine and mixed with the oats or corn makes a good diet.

Arsenic is the only medicine that is considered by the best authorities as of any value, and this only palliates the symptoms. Use the solution of arsenic in hydrochloric acid, which should be purchased at a drug-store because it is then of uniform strength. Each ounce of this solution should contain about four and one-half grains of arsenic. For about two weeks, mix with the bran or oats three times a day, a tablespoonful of this solution; then for the next two weeks give the same dose only twice a day; then once a day for a month. If bowels are costive, give one pint of raw linseed oil, once or twice a month. Medicine is only secondary; the food is of the greatest importance. Never breed from animals having the "heaves."

NOTE.—If buying a horse of one of the "smart" individuals, a careful examination should be made for the purpose of detecting the heaves. These "jockeys" by keeping the stomach and intestines empty, and giving depressing medicines, manage to hide the symptoms of heaves for a short time. To detect the heaves, give the horse all the water he will drink, and then have him ridden or driven up a hill, or on a heavy road. This will bring out the peculiar breathing, common to the heaves. The giving of arsenic to suppress the symptoms is one of their favorite tricks.

Chronic Cough. A cough of this character may succeed acute disease of the respiratory organs, such as laryngitis, bronchitis, and pneumonia. It is a symptom and not a disease, therefore the proper treatment is to find the cause of the trouble and cure that disease if possible. Chronic cough accompanies the "heaves," chronic bronchitis, and chronic roaring. It is a symptom of chronic indigestion and worms.

Pleurodynia. A rheumatism of the intercostal muscles, (muscles between the ribs). The symptoms to a non-expert are similar to pleurisy. It is distinguished from pleurisy on account of lack of fever, cough, and friction sound is absent when the ear is applied over the lungs. The treatment is the same as for rheumatism of the other parts.

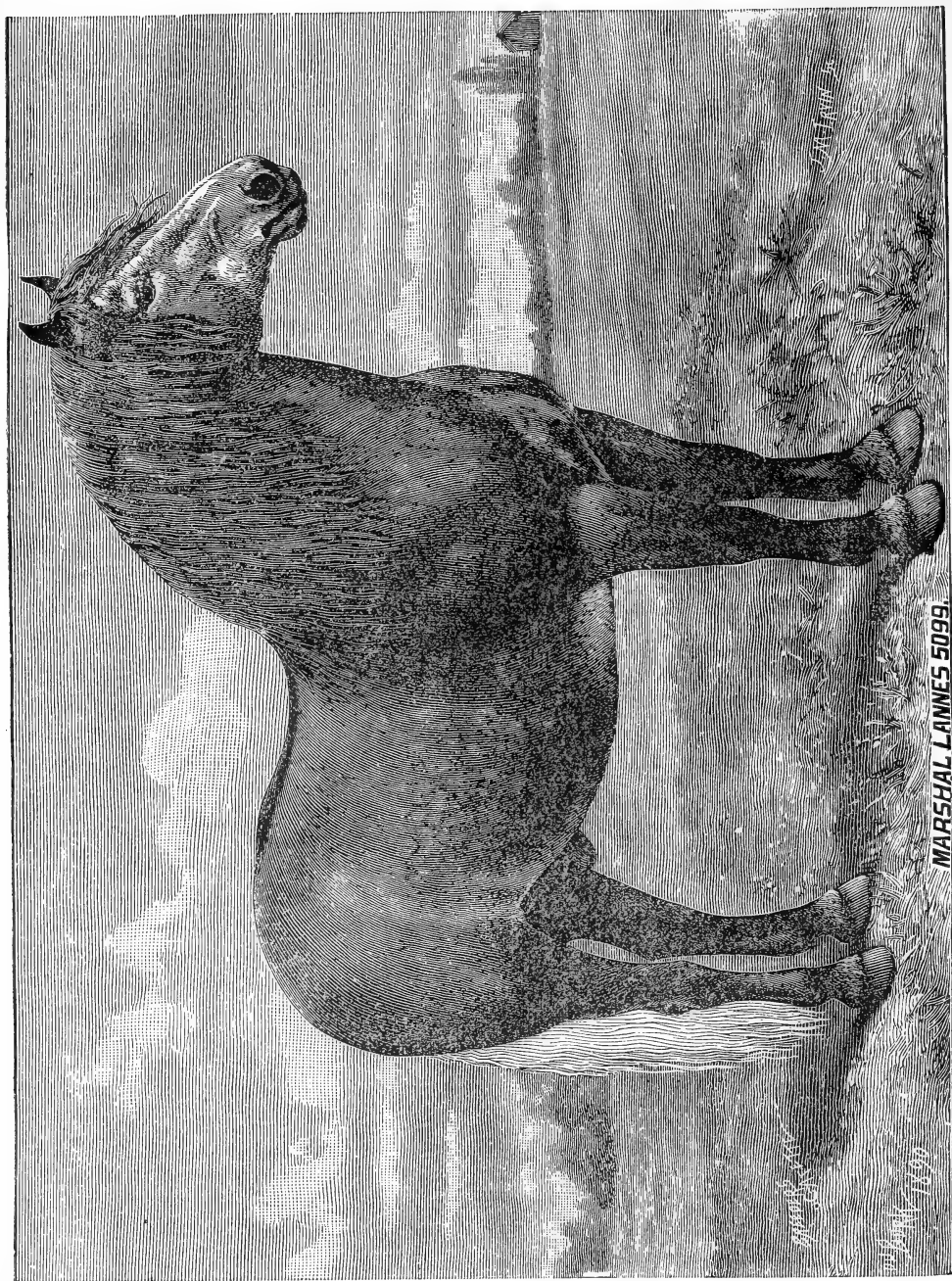
Wounds Penetrating the Walls of the Chest. It is well to call a veterinarian immediately as the treatment of wounds of this character require professional skill, and even that as soon as possible.

Thumps or Spasm of the Diaphragm. This disease is often thought to be palpitation of the heart. While it is true "palpitation of the heart" is occasionally called thumps, yet the disease we here deal with is of a very different character. The diaphragm is the essential organ of respiration and the spasmodic or irregular contractions of it produce what is known as hiccoughs in man. Thumps in horses are identical with hiccoughs in man, although the peculiar noise is not made in the throat in all cases.

This affection should be easily distinguished from palpitation of the heart. The whole body is affected by the "jerky motion" and it is not confined to the region of the heart. Place one hand over the heart and the other near the middle of the last rib, and the "jerky motion" will be felt under the last rib and will have no connection with the beating of the heart.

What to Do. Since the trouble is produced by the same causes that bring on congestion of the lungs, the same remedies should be used that have been recommended for that disease. If not relieved death usually results from congestion of the lungs, and it is often seen in connection with that disease.

Rupture of the Diaphragm. Examinations of the bodies after death, show a great many cases of rupture of the diaphragm. It is the general opinion that this happens after death, and is caused by gases which arise as the result of the decomposing remains. It is possible to happen before death but there are no symptoms by which it can be determined.



MARSHAL LANNES 5099.

CHAPTER VI.

CIRCULATORY ORGANS.

Their Diseases and How to Cure Them.

DESCRIPTION OF THE HEART, ARTERIES, AND VEINS, INFLAMMATORY DISEASES, FUNCTIONAL AND ORGANIC DISEASES OF THE HEART, DISEASES OF THE ARTERIES, DISEASES OF THE VEINS, DISEASES OF THE LYMPHATIC SYSTEM.

WONDERFUL as it seems with our present knowledge, it is only a few centuries ago that Harvey discovered the circulation of the blood. Since that time it has been discovered that there is still another system of circulation in the body intimately connected with the blood vessels. That is known as the lymphatic or absorbent system and consists of a series of tubes which absorb and convey to the blood certain fluids. These tubes lead to sac-like structures called lymphatic glands, through which these fluids pass on their way to the right lymphatic vein and thoracic duct. These lymphatic glands contain lymph which is on its way to the larger trunks undergoing a sort of filtration.

The Heart. Nearly in the center of the chest is a hollow, cone shaped muscular organ called the heart. Its average weight is between six and seven pounds. It extends from near the third to the sixth rib, having the base of the cone near the third rib, and extending downward, backward, and toward the left side. It is suspended from the spine by the large blood-vessels and held in position by the sac in which it is con-

tained being fastened to the breast-bone (sternum). The sac in which the heart is contained is called the pericardium (peri=around, cardium=the heart). This is a membrane of a fibrous, dense nature, which is lined with a delicate serous membrane, of which there are two layers, the inner one closely fastened to the heart, the outer to the fibrous sac. There is a space between them in which is found a small amount of serum, which is secreted by this serous membrane for the purpose of lubricating the surfaces, which rub against each other every heart beat.

How Divided. The heart is divided into four cavities, having two on the right side which contain the venous (blue) blood, and two on the left which contain the arterial (red) blood. It is so divided that the cavities on the right side have no communication with those on the left, but the two cavities on either side are connected by valves. The upper cavities are called AURICLES from their supposed resemblance to a dog's ear. The one on the upper right side is called the right auricle, the one on the left, the left auricle. The cavities at the lower part of the heart are called ventricles, taking the names right ventricle and left ventricle according to location.

Action of Heart. The right side of the heart receives the dark blue blood from the VENA CAVA. It is received into the right auricle, where it passes through the TRICUSPID valve into the right ventricle. It is there forced out into the lungs through the pulmonary artery. The blood here gives up its CARBON-DIOXIDE, takes on OXYGEN, and returns to the left auricle, through the pulmonary vein. The blood, now of a bright scarlet hue, passes through the BICUSPID VALVES into the left ventricle, from which it is forced out through the aorta into the arteries, by which it is distributed over all parts of the body.

Movements of the Heart. When the heart closes to force out the blood, the movement is called SYSTOLE, and when expanding, DIASTOLE. There is a pause following such expansion. Hence the heart takes a rest after each beat. This amounts to several hours per day.

Functions of Blood-vessels. The blood-vessels carry blood to and from the various parts of the body. They are divided into three classes: THE ARTERIES AND ARTERIOLES, carrying blood from the heart; the CAPILLARIES, bring the blood into close relation with the tissues; and the VEINS, carrying the blood back to the heart.

Arteries. These are hollow tubes carrying blood to the capillaries, which are situated in all parts of the body. The arteries contain no

valves, but consist of three layers. The inside one forms a smooth surface for the blood to pass over, the outside one an elastic layer, while between them is a muscular layer which regulates the amount of blood received by each part. This coat is necessary, as it is manifest that the heart cannot regulate the supply of blood sent to each portion of the body.

Capillaries. The capillaries are interposed between the ends of the arteries and the beginning of the veins and not only carry blood, but, owing to the construction of their walls, they enable the blood to come in intimate relations with the tissues. By the blood thus coming so intimately connected with the tissue, it is enabled to deposit nourishment, give up its oxygen, and take in return what has been chemically united. They take from the blood the nourishment, and give it off as a fluid known as LYMPH, whose function is to irrigate and nourish.

Veins. In most veins are valves which flap back against the side as the blood flows onward toward the heart. Thus the blood cannot be forced backward by any cause. The walls of veins are not so thick, strong, or elastic as are those of the arteries—the strength and elasticity not being needed, as the blood simply flows through the veins and is not forced through as it is in the arteries. The blood is aided in its course through the veins by a contraction of the voluntary muscles, indirect action of the valves in the veins, and by suction produced by the movements of the thorax in breathing.

Pulse. At certain portions of the body arteries come near the surface. If the finger be placed over these blood-vessels a beating can be felt. These beats are caused by the heart forcing the blood into the arteries. Each pulse represents a heart beat.

Character of the Pulse. This has been described under the chapter DISEASES OF THE CIRCULATORY ORGANS.

INFLAMMATORY DISEASES OF THE HEART.

General Structures. There are three parts to the heart that are liable to inflammation. From the names of these structures the names of the diseases are derived. Myocardium is the muscular structure of the heart; endocardium is the serous membrane lining the heart; and pericardium is the sac surrounding the heart.

Myocarditis. An inflammation of the muscular structure of the heart. This is rarely detected without being connected with inflammation of the endocardium or pericardium. The causes are over-exertion

or heart strain, influenza, rheumatism, etc. Since it is not recognized unless involved with one or the other of the above mentioned diseases, and the symptoms and treatment are so closely connected with those diseases, it will suffice to describe them under those ailments.

Endocarditis. This is an inflammation of the serous membrane lining the heart. It is often found in general rheumatism which involves the serous membrane.

Symptoms. The most prominent symptoms which characterize this disease are a staggering gait with painful movement of the fore-legs; a constant irregularity of the heart's action; but there will be equality of strength regardless of the rapidity of the beating of the heart. In the chronic form there is generally a persistent palpitation with irregularity of the rapidity of the heart beats. This disease may be ushered in by a chill, with sudden and marked rise in temperature. The pulse rapidly decreases in strength or may become irregular, while the heart beats more or less tumultuously. In early stages soft blowing sounds may be heard by placing the ear over the heart on the left side, which correspond in number and time to the heart's beating. In nearly all cases there is partial suppression of the urine. In fatal cases death often occurs about the fourth or fifth day.

What to Do. The most reliable medicine known to control the irritability of the heart, is the tincture of digitalis in twenty-drop doses, repeated every hour. After the desired action upon the heart is obtained the dose may be repeated every two or three hours, or as the case requires. Fluid extract of convallaria majalis, in two-dram doses, will quiet the tumultuous action of the heart where digitalis fails. Avoid bleeding; cold applications around the chest or over the heart; blistering; and stimulating applications to the chest. Chlorate of potash, in two-dram doses given in drinking water every four hours for the first five or six days, and followed by the nitrate of potassium, in half-ounce doses for a week, or until the urine becomes very profuse. Where rheumatism is present give two-dram doses of salicylate of soda instead of the chlorate of potash. Iodide of potassium in one-dram or two-dram doses should be given early in the disease, and may be repeated two or three times a day for several weeks.

Absolute rest and warm stabling, with comfortable clothing, are necessary.

Pericarditis. This is an inflammation of the sac into which the heart is enclosed. It may be caused by cold and damp stabling, expos-

ture and fatigue, from wounds caused by broken ribs, etc. It is usually associated with an attack of rheumatism, influenza or pleurisy.

Symptoms. This disease shows itself abruptly by a brief stage of chills accompanied by evidence of pain in moving; a short painful cough, rapid and short breathing; and high temperature, with a rapid and hard pulse. The fever, with corresponding pulse, is highest in the evening and lowest in the morning. In the early stages the pulse is regular in beat; later the heart-beat becomes muffled, and may be doubled. By placing the ear against the left side of the chest behind the elbow a rasping sound may be heard, corresponding in number to the heart-beat. Between the second and fourth days this sound disappears and by striking on the surface over the heart, there will be found an increased dullness. In the acute form of this disease the animal may die in a few days, but in the chronic form the case progresses much more slowly.

What to Do. "In acute or subacute pericarditis the tincture of digitalis and tincture of aconite root may be mixed, taking equal quantities, and give twenty to thirty drop doses every hour till the pulse and temperature become reduced. Bandages should be applied to the legs; if they are very cold, tincture of capsicum should be first applied; the body should be warmly clothed in blankets to promote perspiration. When the suffering from pain is very severe, two ounces of tincture of opium may be given once or twice a day; nitrate of potassa, half an ounce, in drinking water, every six hours; after the third day, iodide of potassa, in two-dram doses, may be substituted. Hot packs to the chest in the early stages of the disease may give marked relief, or smart blisters may be applied to the sides of the chest with benefit. If the disease becomes chronic, iodide of iron and gentian to support the strength will be indicated, but the iodide of potassa, in one or two-dram doses, two or three times a day, must not be abandoned so long as there is an evidence of effusion or plastic exudate accumulating in the pericardial sac. Where the effusion is great and threatens the life of the patient, tapping, by an expert veterinarian, may save the animal."

FUNCTIONAL AND ORGANIC DISEASES OF HEART.

Palpitation of the Heart. This is a tumultuous and usually an irregular beating of the heart. It may be caused by indigestion, sudden excitement, excessive speeding, etc. (See "Thumps"). Study carefully the difference in the symptoms of the two diseases.

Symptoms. The heart beats may be violent enough to jar the whole body, and often it may be heard quite a distance from the animal. The jar will correspond to the beating of the heart. This disease can usually be traced to the cause, which may be avoided or overcome in the future. Rest, a mild stimulant, or a dose or two of tincture of opium or tincture of digitalis will generally give relief. It must be regarded as a symptom when organic.

Enlargement of the Heart. Hypertrophy of the heart, or cardiac enlargement frequently follows an increased demand for propelling power.

Symptoms. In addition to the usual symptoms manifested in organic diseases of the heart, there is a painful and heavy pulsation at each heart beat. These pulsations are regular. When full and strong at the jaw, there is a tendency to congestion of the capillary vessels, but if small and feeble an obstacle to the escape of blood may be suspected.

Treatment. If the cause can be discovered and removed it should be done. Hydrocyanic acid in thirty drop doses twice a day, may relieve muscular irritability. Give general tonic, avoid overwork or excitement as well as bulky food.

DISEASES OF THE ARTERIES.

Inflammation of the Artery. This disease is rarely observed in the horse as a primary disease. It may extend only to the inner coat or it may involve all of the layers of which there are three.

Symptoms. There will be a painful swelling along the inflamed vessels, throbbing pulse, coldness of the parts fed by the inflamed artery.

Treatment. Give one-dram doses of the carbonate of potassium mixed with four ounces of liquor acetate of ammonia, every six hours. Feed scalded bran enough to produce loosening of the bowels. Put on applications of hot water or hot hop infusions.

DISEASES OF THE VEINS.

Phlebitis. Inflammation of veins may be confined to a limited portion of a vein or it may attack the vein for a long distance, occasionally extending from a limb or foot to the heart.

Symptoms vary according to the extent and the severity of the inflammation. The vein is usually swollen and thickened so as to resemble an artery.

What to Do. Apply a smart blister over the affected part; open any abscess that may be formed; give animal complete rest; and keep bowels loose with bran mash. When fever runs high give half-ounce doses of nitrate of potassium, in the drinking water, which may be changed in two or three days for dram doses of the iodide of potassium. Give animal carbonate of ammonia, one dram, and powdered gentian three drams every six hours should the animal show great weakness.

Varicose Veins. Otherwise named varix, and dilatation of veins. This disease is the result of weakening of the coats of the veins from inflammatory diseases. The vein which lies near the surface on the inside of the hock-joint is sometimes affected. This is sometimes due to the pressure of a spavin. It is occasionally seen in stallions as dilatation of the cord of the testicles. Piles or hemorrhoidal veins are occasionally met with, principally in horses which run at pasture.

Treatment. Piles may often be reduced by astringent washes—tea made from white oak bark or a saturated solution of alum. Stallions having enlarged testicular chord should wear suspensory bags, when exercised.

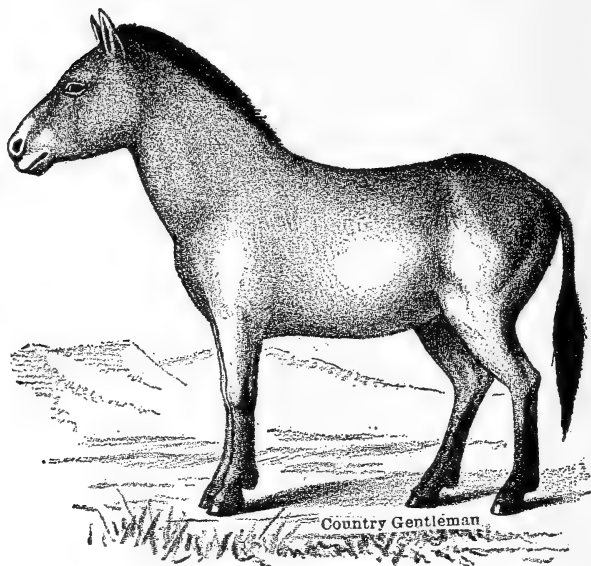
DISEASES OF THE LYMPHATIC SYSTEM.

Inflammation of the Lymphatic Structures. This inflammation usually effects a hind-leg, very seldom a fore-leg. This application is sudden in its attack, exceedingly painful, accompanied by a high temperature, and great general disturbance.

Symptoms. Usually commences with a chill, rise in temperature, and some uneasiness; in a short time it is followed by lameness in one leg and swelling on the inside of the thigh. The limb is very tender to the touch; the animal perspires; the breathing is accelerated; pulse hard and quick; and the temperature may reach 106° F. The bowels become constipated; urine becomes scanty; symptoms on the increase for about two days, then stationary for same time; the fever then lowers; swelling goes down and becomes less painful. The swelling seldom all leaves the leg; there is left behind a permanent enlargement, and attacks return occasionally.

Elephantiasis. In severe cases the skin loses its hair in patches, the limb remains more or less enlarged due to a fibrous growth, which is known by the name of Elephantiasis.

What to Do. Externally; bathe the leg every ten or fifteen minutes for six or eight hours with vinegar and water, equal parts, to which add two ounces of nitrate of potassium to each gallon of the mixture. At the end of the bathing; dry with woolen cloths and bathe with camphorated soap liniment. Internally; give tincture of digitalis and aconite root, equal parts of each, thirty drops every hour until the fever and pulse become reduced. Half-ounce doses of nitrate of potassium in the drinking water every six hours; bran mashes; and complete rest. This treatment if used early in the attack very often brings about a remarkable change within twenty-four hours.



CHAPTER VII.

THE NERVOUS SYSTEM.

Its Diseases and How to Cure Them.

DIVISIONS OF THE NERVOUS SYSTEM, FUNCTIONS OF THE VARIOUS PARTS, INFLAMMATION OF THE BRAIN OR ENCEPHALITIS, MAD STAGGERS OF THE OLD WRITERS OR MENINGITIS, SUNSTROKE OR HEAT EXHAUSTION, SPASM OF THE THIGH, INFLAMMATION OF THE MEMBRANES SURROUNDING THE SPINAL CORD, LOCK-JAW, HYDROPHOBIA, ELECTRIC SHOCK, ETC.

SITUATED within the body having the brain as a center is a wonderfully complex system of nerves, which is almost entirely controlled by the will of the animal. Besides this there is another set, independent of this system, which regulates the beating of the heart, and all other movements over which the will has but little or no control. The latter consists of numerous small centers, called ganglia, extending in two great chains from the head to the tail, on each side of the back-bone, and closely connected with the other system by a peculiar communication. They are usually considered and defined as follows:

Divisions of the Nervous System. There are two divisions of the nervous system, the CEREBRO-SPINAL, or that presiding over animal life, and the sympathetic, that regulating organic life.

Structure. It is composed chiefly of two structures; the gray, originating impulses and receiving impressions, and the white, conducting impressions.

Cerebro-spinal System. This consists of the BRAIN, SPINAL GANGLIA, CRANIAL NERVES. and SPINAL NERVES.

Membrane Surrounding the Brain. The membrane which lines the skull constituting an interior periosteum is called the DURA MATER; beneath this is a delicate membrane called the ARACHNOID, and still beneath this is another membrane, which even dips into the convolutions of the underlying brain. This is called the pia mater. These three divisions taken together are called the meninges.

Divisions of the Brain. The divisions of the brain are the CEREBRUM, CEREBELLUM, PONS VAROLII and MEDULLA OBLONGATA.

Functions of the Cerebrum. "The cerebral hemispheres are the organs by which perception is carried on and from which motor impulses are given out. They contain the organ of the will; they possess memory, or the means of retaining impressions of sensible influences." (HARE.)

Functions of the Cerebellum. "It is absolutely insensible to irritation and may be cut away without any signs of pain; its removal from the body or destruction by disease is generally unaccompanied by loss or disorder of sensibility. Animals from which it is removed can see, hear, and feel pain to all appearance as perfectly as before. It governs the coordination of movements, and while irritation of the cerebellum produces no movements at all, remarkable results are produced by removing part of its substance. As portion after portion of it is cut away the animal gradually loses the power of springing, walking, standing, or preserving its equilibrium. If laid upon its back it cannot recover its normal posture but struggles to get up, and if a blow is threatened tries to avoid it, but fails to do so. According to Gowers, the middle lobe of the cerebellum governs equilibrium by means of afferent fibres from the semi-circular canals and the ocular muscles and also the muscles of the legs." (HARE).

Function of the Pons Varolii. "It contains a large number of nerve fibres both transverse and longitudinal, and is a conductor of impressions from one part of the spinal axis to another. Concerning its functions as a nerve centre little or nothing is certainly known." (HARE).

Medulla Oblongata. This is the prolongation of the spinal cord, extending from the spinal cord to the pons (bridge) Varolii. This part of the brain is very large in the horse; it is pyramidal in shape, the narrowest part joining the cord.

Spinal Cord. This occupies the cavity of the backbone. It extends from the brain down to the last vertebra. It is protected by the same membranes as the brain, but in the brain the gray matter is on the outside, while in the spinal cord the gray matter is within. It is divided into halves and these again subdivided into two parts. It contains two nerves of motion and two of feeling. The nerves of motion are the ones which carry the orders of the mind to the different organs, while the nerves of feeling bring back impressions which they receive.

Spinal Nerves. These are forty-two or forty-three in number, arise each by two roots, a superior or sensory and an inferior or motor. The nerves originating from the brain are twenty-four in number, and arranged in pairs, which are named first, second, third, etc., counting from before backward. They also receive special names, according to their functions, or the parts to which they are distributed, viz:

- | | | |
|-----------------|---------------|-----------------------|
| 1. Olfactory. | 5. Trifacial. | 9. Glosso-Pharyngeal. |
| 2. Optic. | 6. Abducens. | 10. Pneumogastric. |
| 3. Oculo-motor. | 7. Facial. | 11. Spinal-Accessory. |
| 4. Pathetic. | 8. Auditory. | 12. Hypoglossal. |

INFLAMMATION OF THE BRAIN TISSUES AND ITS MEMBRANES.

Encephalitis. Inflammation of the brain is caused by exposure to extreme heat or cold; excessive continued excitement; direct injuries to the brain; and sometimes appears as a result of influenza, pyæmia, and poisons that directly affect the brain matter.

Symptoms. Acute inflammation may commence by an increased sensibility to noises, with more or less nervous excitability, contraction of the pupil of the eyes, and a quick hard pulse. These symptoms are not always present in acute attacks. There will follow twitching of the muscles, convulsive or spasmodic movements, eyes wide open with shortness of sight. The animal becomes afraid to have his head handled. Convulsions and delirium will develop, with inability of muscular con-

trol, often followed by stupor and coma. When the membranes are much implicated convulsions and delirium with violence may be expected, but where the brain substance is principally affected, stupor and coma will be the most prominent symptoms. When the brain substances is principally affected the pulse will be soft or depressed with sometimes a dilation of pupils and deep, slow, stertorous breathing; but if the membranes are implicated the pulse will be quick and hard. The animal may become very violent early in the disease, and by rearing up, striking with the fore-feet or falling over do himself great injury, but usually the animal maintains the standing position, propping himself against the manger, until he falls from inability of muscular control.

Treatment. See treatment under head "General Treatment for Inflammation of the Various Brain Structures."

Meningitis or Mad Staggers of the Old Writers. This is an inflammation of the cerebral envelopes. It is caused by excess of heat or cold, wounds of the skull and its contents, rheumatism, influenza, rupture of the blood-vessels of the membrane surrounding the brain.

Symptoms. In an attack of the acute form the symptoms are often very violent. The animal has violent pains in the head which is indicated by the animal flying back in the halter; plunging forward or running ahead, without regard to any obstructions; the pulse is very rapid; the breathing accelerated or panting; the pupils of the eyes contracted; the muscles of the body quivering. These symptoms may develop in a few minutes or in a few hours. If the animal does not get relief, spasms of stiffness of the muscles along one or both sides of the neck or back will become evident; the head will be held up higher than usual; the eye-balls will be drawn back in their sockets; the eye-lids twitch; convulsions and furious delirium will soon appear, followed by coma (insensibility) and death.

During the whole course of the disease the least noise will seem to bring on violent paroxysms (spasms), which are very marked during the disease. Between these paroxysms there are quiet moments in which the animal seems dull and drowsy. The urine is frequently forced out in spurts and great efforts are made to effect passage of the bowels.

In the SUB-ACUTE form the symptoms develop more slowly and are less marked by violence. In such attacks the animal may suffer for a week or longer and ultimately recover.

In meningitis the temperature varies from 103° to 107° F., according to the severity of the disease.

Do not confound the violent symptoms of this disease with hydrophobia (rabies). In hydrophobia the animal directs his violence toward some object or upon himself; but in this desire there is only the evidence of severe pain, in the head. Meningitis may be distinguished from encephalitis and cerebritis by there not being any marked symptoms of paralysis of local parts or of coma till near the approach of death.

Treatment. See treatment under head "General Treatment for Inflammation of the Various Brain Structures."

Cerebritis. Inflammation of the brain substance has many causes. Those that produce either of the two last, together with cystic and calcareous tumors, thrombi, uræmic poisoning, etc.

Symptoms. When not in connection with other diseases this disease is seldom recognized during life. It is always confined to some specific portion of the brain, and the symptoms vary according to the part affected. The treatment as given below will be all that can be usually done. As it would not be recognized except by an expert it is unnecessary to give a list of the symptoms.

General Treatment for Inflammation of the Various Brain Structures. "When the animal is found in the first stages of the disease, where the animal is unnaturally excited or has stupor with high temperature and quickened pulse bleed from the jugular vein. Especially in acute meningitis, bleeding is imperatively demanded. The finger should be kept on the pulse, and the blood allowed to flow until there is a marked fluttering or softening of the pulse. As soon as the animal recovers somewhat from the shock of the bleeding, the following medicine should be made into a ball or dissolved in a pint of warm water and be given at one dose: barbadoes aloes, seven drams; calomel, two drams; powdered ginger, one dram; tincture of aconite, twenty drops.

The animal should be placed in a cool, dark place, as free from noise as possible, and cloths wrung out of hot water placed on his head. Renew frequently for twelve hours. When the animal becomes thirsty half an ounce of saltpeter may be dissolved in his drinking water every six hours. Inject warm water into the rectum to aid the action of the physic. Norwood's tincture of veratrum viride, in twenty drop doses, should be given every hour, and one dram of solid extract of belladonna every four hours, until the symptoms become modified and the pulse regular and full.

If this treatment fails to give relief the disease will pass into the advanced stages, or if the animal has been neglected in the early stages the treatment must be supplanted with the hypodermic injection of ergotin, in five grain doses, dissolved in a dram of water every six hours. The limbs may be poulticed above the fetlocks with mustard. Cold water or ice-bags should now take the place of the hot water cloths on the head. Warm blanketing, to promote perspiration, to be used in all cases in which there is not much perspiration.

"If the disease becomes chronic—encephalitis or meningitis—use alteratives and tonics, with such other treatment as special symptoms may demand. Iodide of potassium in two dram doses should be given twice a day, and one dram of calomel once a day, to induce absorption. Tonics, in the form of iodide of iron in dram doses, to which is added two drams of powdered hydrastis, may be given every six or eight hours, as soon as the active fever has abated. In all cases, after the disappearance of the acute symptoms, blisters (cantharides ointment) should be applied behind the poll. When paralytic effects remain after the disappearance of all other symptoms, sulphate of strychnia in two grain doses, in combination with the other tonics, should be given twice a day, and be continued until it produces muscular twitching. Many of the recoveries will, however, under the most active and early treatment, be but partial, and in all cases the animals become predisposed to subsequent attacks. A long period of time should be allowed to pass before the animal is exposed to severe work or great heat. When the disease depends upon mechanical injuries they have to be treated and all causes of irritation to the brain removed. If it is due to stable miasma, uræmic poisoning, pyæmia, influenza, rheumatism, toxic agents, etc., they should receive prompt attention for their removal or mitigation."

Sunstroke or Heat Exhaustion. The term "sunstroke" is applied to troubles caused by exposure to the direct ray's of the sun for hours, when the animal has not received proper care in feeding, watering and rest; and also when caused by the action of great heat, combined with other disturbing elements such as dryness of the air, and an unusual accumulation of electricity.

Symptoms. Generally comes on suddenly. The animal stops, drops his head; begins to stagger; and soon falls to the ground insensible. The breathing is stertorous; the pulse is slow and irregular; cold sweats cover the body; and the animal dies without becoming conscious.

Previous to the other symptoms coming on the animal often requires urging for some time; the perspiration is checked; the animal becomes weak in his gait; the breathing hurried or panting; the eyes watery and bloodshot; nostrils dilated and highly reddened, assuming a dark, purple color; the pulse rapid and weak; the heart bounding.

What to Do. Apply ice or very cold water to the head and along the spine. Give six ounces of whiskey or half an ounce of carbonate of ammonia in a pint of water. Injections into the rectum of ginger tea, moderately strong, or weak ammonia water may benefit. Brisk friction of the limbs, using spirits of camphor when possible, will often yield good results. The stimulant should be repeated in one hour if the pulse has not become stronger and slower.

If the animal is suffering from heat exhaustion instead of sunstroke use the same treatment, only use hot water on the cloths instead of cold. In either case as the animal gets better give as a tonic during convalescence: sulphate of iron, one dram; gentian, three drams; red chincona bark, two drams; mix and give in the feed morning and evening.

How to Prevent. In very hot weather, keep wet sponges or light sunshades on the head while at work, or sponge the head with cold water as often as possible during the day. Do not over feed; water often; keep stables cool and well ventilated. If an animal seems weak and exhausted from work or disease, give tonics.

Spasm of the Thigh or Cramp of the Hind Leg. Horses standing on sloping plank floors, or subject to severe exercise are liable to this disease.

Symptoms. The leg becomes rigid, and efforts to bend it are unsuccessful; it is cold; there is not much pain manifested, unless efforts are made to change position of the leg. The cramp may be of short duration, or it may continue for several days. This "cramp" is often taken for a dislocation of the stifle-joint. In dislocation, the foot is extended backward, and the horse being unable to advance it, drags the foot behind him. An examination of the joint will also show a change of form.

What to Do. Rub the cramped muscles with liniment composed of soap liniment four parts and chloroform one part. Compulsory movement usually causes the muscles to relax very quickly. Therefore take animal out and force him to run or trot. Sometimes a single crack of the whip or a smart blow will cause relaxation. Should this fail, the

liniment may be used along the inside of the thigh, and chloroform, ether, or laudanum given internally. One ounce chloral hydrate will relieve the spasm when given internally, but the cramp may return very quickly after the effect has passed off.

Spinal Meningitis. This is an inflammation of the membranes surrounding the spinal cord. It may be the result of irritating properties of blood poisons, exposure, all forms of injury to the spine, rheumatism, etc.

Symptoms. May be introduced by a chill; a rise in temperature; general weakness; or shifting of the legs. Soon a painful, spasmodic twitching of the muscles set in, followed by a hardness of muscles along the back-bone, when the animal will move very stiffly and evince great pain in moving; evidences of paralysis develop; either holds the urine, or it runs away without effort; and marked fever at the beginning of the attack, together with spinal symptoms. This disease generally becomes seated and is then principally known by a paralysis back of the seat of the disease. The whole or only portions may be paralyzed.

Treatment. Put along the spine, bags filled with broken ice, to be followed later by strong blisters. Control fever by giving twenty-drop doses every hour of Norwood's tincture of veratrum viride, until the desired effect is obtained. One dram of the fluid extract of belladonna, to control pain and the flow of blood to the meninges may be given every five or six hours till the pupils of the eyes become much enlarged. If the pain is very severe inject hypodermically five grains of sulphate of morphine. Keep the animal as free from excitement as possible. If the urine is retained in the bladder it must be drawn off every six hours. In very severe attacks the animal dies in a few days. If the animal grows better give two-dram doses of iodide of potassium in the drinking water, morning and evening. Also once a day give one-dram of nuxvomica and twice a day same dose of iodide of iron.

Cerebro-Spinal-Meningitis. This disease is very apt to attack every animal in a stable, although it is conceded by good authority that it is neither contagious nor infectious. It seems to be connected in some way with the food or general surroundings. In many cases the disease has broken out in various localities, where portions of the same lot of oats, hay, and brewers grains have been fed.

Special Precautions Necessary. If this disease breaks out in a stable, remove all the animals at once. Provide them with clean, well-ventilated, well drained stables elsewhere, and give each animal one-

dram of the extract or half an ounce of the tincture of belladonna, twice a day for several days as a preventive. Clean the old stable thoroughly from all matter, throw over it some chloride of lime, and give the stable a coat of whitewash in which four ounces of carbolic acid has been dissolved in every gallon. Let the stable dry thoroughly.

Symptoms. There are three grades of attack into which the symptoms may be divided.

FIRST GRADE. In the most rapidly fatal cases, the first indications are usually a weak, staggering gait; part or total loss of power to swallow; eyesight is poor; muscles twitch and slight cramps may be noticed; soon followed by paralysis of the whole body; inability to stand; sometimes a delirium in which the animal goes through a series of movements as if trotting or running; the delirium becomes violent, and the animal may seriously bruise himself in his struggles, but a deep sleep usually renders him unconscious till he dies, which usually follows in from four to twenty-four hours, from the beginning of the first symptoms. The pulse is variable during the disease; it may seem almost gone at times; then very rapid and irregular; the breathings generally quick and catchy. When this severe and rapidly fatal form appears, it may not be possible to determine it from encephalitis, only from the fact of other animals in the same stable or neighborhood being similarly affected.

SECOND GRADE. This is in not so severe a form as the last. The first noticeable symptom is a difficulty in swallowing; a slowness in the chewing of the food; and a weakness which may be first noticed by a loss of strength of the tail, the animal being unable to switch it or offer any resistance if you raise it up over the croup. The pulse is generally a little slow; no evidence of pain; breathing unchanged; temperature little less than in health; bowels may be constipated. If the result will terminate favorable, there will be no change of symptoms for two or three days, after which gradual improvement. But if the termination will be death, immediately following the stationary condition the animal may lose its power to swallow, and the weakness in gait becomes more and more noticeable; then sleepiness or coma may appear; the pulse depressed, slow and weak; stertorous breathing; unable to stand; and some rigidity of the spinal muscles or partial cramp of the neck. Death follows in such cases in from four to six days.

THIRD GRADE. In this last or mildest form, the inability of voluntary control of the limbs becomes but little marked; the power of

swallowing while lessened is never entirely lost; the animal has no fever, pain or unconscious movements. The animal will begin to improve about the fourth day and recover.

When changes for the better take place the symptoms usually leave in the reverse order in which they came on, but local paralysis may remain for some time.

Treatment. "In the worst class of cases treatment is very seldom successful, and it is dangerous to attempt to give medicine by the mouth because the animal cannot swallow. Cold shower baths may possibly induce revulsive action in connection with stimulants into the rectum, four to six ounces of whisky in two pints of milk; the breathing of ammonia vapor from a sponge wet with dilute aqua ammonia may bring the animal to consciousness.

In the second class of cases the treatment recommended by Professor Large consists in giving a cathartic composed of one ounce of aloes and the giving of one to two drams of the solid extract of belladonna, alternated every three hours with thirty drops of tincture of aconite root, and the application of blisters to the neck, spine, and throat. When the animal is unable to swallow, one-fourth-grain doses of sulphate of atropia may be hypodermically injected under the skin every four, six, or eight hours, as the case may demand. The atropia is a heart stimulant, increases capillary circulation, and quiets pain and excitability. When the most prominent symptoms abate give such food as the animal may be able to eat; keep fresh, cool water constantly before him; support him in slings if necessary; clean stabling and plenty of fresh air are of the utmost importance."

Lock-Jaw or Tetanus. This disease is specially shown by spasms which affect the muscles of the face, neck, body, and limbs and all the muscles supplied by the cerebro-spinal nerves.

Symptoms. The first indication of this disease is difficulty in chewing and swallowing; an extension of the head; and a membrane called the haw, protruding over the inner part of the eye. This haw will turn farther over the eye if the nose is lifted. The animal is not able to open the jaws to their full extent, and the effort to do so will produce spasms of the muscles of the jaw and neck. The muscles of the neck and along the spine become rigid and the legs are moved as if they were stiff. The least noise throws the animal into increased spasm of all the affected muscles. The tail is usually raised and held without moving; the bowels constipated; the temperature and pulse not much changed.

These symptoms in an acute attack become rapidly worse till the muscles become hard—in a state of rigid spasm—with a tremble continuously running through them; cold sweat breaks out on the body; breathing becomes painful; jaws are set; eye-balls drawn back; lips drawn tightly over the teeth; nostrils enlarged; and the animal showing extreme agony till death comes.

In the sub-acute cases the jaws are never entirely locked; the muscles are not so rigid; the nerves not so excitable. There is some stiffness of the neck or spine, which is shown when the animal is turning or moving; the haw is turned over the eye-ball when the nose is lifted. All symptoms gradually increase for about ten days and then gradually diminish under careful treatment, or otherwise they go on to the most severe type and end in death.

Tetanus may be mistaken for spinal meningitis, but the peculiarity of the spasm-locked jaw; the peculiarity of spasms due to swallowing; the haw over the eye; and the eye-balls drawn back into the head should easily note the difference.

Treatment. Put the animal in a dark box stall without bedding, as far away from other horses as possible; cover with sheet in fly time; keep every noise away from the animal.

Give at once aloes, six to eight drams; mixed with solid extract of belladonna, two drams. Give in form of ball; but if the animal is too much excited or can not swallow, mix it with two ounces of olive oil and throw on the back of the tongue with a syringe. If the jaws are set, or nearly so, do not try to give medicine by the mouth. In such cases use hypodermic injection under the skin of one-quarter of a grain of atropia; and five grains of sulphate of morphia; dissolved in one dram of pure water. Repeat often enough to keep animal under its influence all the time. Good results may be obtained by injecting per rectum the fluid extract of belladonna and of cannabis indica, of each one dram, every four or six hours. This may be diluted with a quart of milk. If unable to swallow liquids give rectum injections of oatmeal gruel and milk. This will help sustain the strength of the animal. Good results may be obtained by putting woolen blankets over the upper part of the head and neck and the greater part of body, and keeping them wet with very warm water. Continue this for several hours at a time.

Hydrophobia or Rabies. This is the result of a bite from a rabid animal—generally a dog or a cat. The disease follows the bite in from three weeks to three months—very rarely in twelve or fourteen days.

Prevention. When it is positively known that an animal has been bitten by a rabid animal, immediately, cauterize the wound with a red-hot iron. This may destroy the poison before it is taken up by the blood.

Symptoms. The first evidences of the disease may be excitability and viciousness. The approach of a person, causes the animal to kick, strike, or bite at any object near him. Often the animal will bite his own legs or sides, tearing the skin. The eyes are staring and blood-shot; ears held up; and the head erect. In some cases the animal will continually rub and bite the wound caused by the rabid animal. This symptom may precede all others. The furious symptoms appear spasmodically; at other times the animal is quiet and may eat and drink, although swallowing becomes painful near the end.

Rabies may be mistaken for lock-jaw. In that disease there is rigidity of the muscles of the jaws or stiffness of the neck or back very early in the attack, and the animal shows no signs of viciousness.

Treatment. As soon as the nature of the disease is ascertained the animal should be killed.

Electric Shock. Since electric wires are becoming so common, the accidents arising from coming in contact with them is of frequent occurrence, and has the same effect upon the animal system as a shock of lightning. There are two degrees of electric shock; the one killing directly and the other producing temporary insensibility, from which recovery is possible. In the latter case the animal is usually insensible; the respiration slow, labored or gasping; the pulse slow, feeble, and irregular; and the pupils dilated and not sensitive, or they may be contracted and sensitive. The temperature is lowered. There may be a tendency to convulsions or spasms. The predominating symptoms are extreme heart and respiratory depression.

Treatment. Sulphate of atropia should be given hypodermically in one quarter grain doses every hour or every two hours until the heart beats are strengthened, the number and fullness of the breathing increased and consciousness returns. Stimulating injections into the rectum may also be useful in aiding the circulation; for this purpose whisky or ammonia may be used.

CHAPTER VIII.

THE URINARY ORGANS,

Their Diseases and How to Cure Them.

DIABETES INSIPIDUS, EXCESSIVE URINE, SACCHARINE DIABETES, GLYCOSURIA, BLOODY URINE, POISONING BY ALBUMINOIDS, ACUTE INFLAMMATION OF THE KIDNEYS, SPASM OF THE NECK OF THE BLADDER, INFLAMMATION OF THE BLADDER, URINARY CALCULI, ETC.

THESE organs to a large extent are the sanitary scavengers and purifiers of the system. It is through their action that most of the products of normal cell-life are carried off. The body is a great chemical laboratory and within it is carried on wonderful changes, which renew the tissues of the body as well as destroy those that are worn out. These chemical changes produce many poisons that will cause disease if left within the body. To remove these poisons, with the aid of the skin, is the function of the urinary organs. The kidneys are the organs which separate from the blood the substance by which the nitrogen of the decomposed or worn out tissue is given off. This substance is called UREA. Most of the other secretions of the body are useful in various ways, as the bile from the liver and the gastric fluid from the stomach are used in digestion, and the perspiration is a means of cooling the body by evaporation, but the secretion of the kidneys cannot be utilized in any other process and hence must be removed from the system.

Kidneys. These glands are two in number, one lying on each side of the vertebræ just forward of the loins. The right kidney, weighing

twenty-three ounces, is shaped like a French bean (SEE MANIKIN OF THE HORSE) and extends from the loins forward to beneath the heads of the last two ribs. The left kidney, (SEE MANIKIN OF THE HORSE), is the shape of the heart of cards, and extends from the loins forward beneath the head of the last rib. Each kidney consists of these distinct parts :

a. The external or vascular part, in which the blood-vessels form elaborate capillary network within the globe-like sac's which form the beginnings of the secreting tubes.

b. The internal part, made up in the main of the blood-vessels, lymphatics, and nerves extending between the notch on the inner border of the kidney to and from the outer vascular portion, in which the secretion of urine is almost exclusively carried on.

c. A large sac-like reservoir in the centre of the kidney into which all the urine tubes empty their secretions. From this reservoir there leads a tube, called the ureter, which carries off the urine to the bladder. There are two of these tubes, one from each of the kidneys, and they open by a valve-closed orifice into the roof the bladder just in front of the neck.

Action. The arteries which carry the blood to the kidneys are called RENAL arteries, and the veins which carry the blood from the kidneys to the large veins leading to the heart are called RENAL veins. The kidneys do not act constantly but alternate in their action. The blood passes into the kidneys through the arteries, it then reaches the capillaries of the kidneys which have the power of removing the watery part of the blood containing urea. The blood is then taken up by the small veins and carried to the renal veins.

Bladder. This is a reservoir which receives the urine from the kidneys through the arteries, and holds it until the distension is sufficient to cause its voluntary discharge. Circular muscular fibers surround the neck of the bladder which keep it closed, and looped muscles extending in all directions forward from the neck around the unopen end of the bladder empty it by contracting. A dilatable tube (urethra) extends from the neck of the bladder backward on the floor of the pelvis. In the male the urethra extends through the penis to its free end, where it opens through a conical papilla of a pink color. In the full grown female the urethra is not far from an inch in length, and it is surrounded by the circular muscular fibers which closes the neck of the bladder. It opens directly in the middle line of the floor of the vulvas about four and one-half inches from its outside opening.

Changes in the Urine. In health the urine of the horse is of a deep amber color and it has a strong odor. On a feed of grain and hay it may show a uniform transparency, while on grass there is an abundant white deposit of lime. There is scarcely an important organ of the body that can suffer derangement without its showing in the urinary system. Therefore, the condition and changes found in the urine, while they may not mark a direct disorder of the urinary system, they serve as an indication of a disturbance of some organ, and these changes are often a great help in determining the character of a disease. The action of the skin and the action of the urinary system are closely allied. In summer when there is profuse sweating, the quantity of urine is lessened, but in winter when there is but a small quantity of liquid exhaled through the skin, the urine is increased in quantity. This action of the skin and kidneys usually balance and keep within the limits of health, but the quantity of urine may become so small that there is not enough liquid to properly hold in solution and carry off the solids, and then crystalize and form stone and gravel.

A disordered liver may produce an excess of biliary coloring-matter and stain the urine, or may cause an excess of acid (hippuric) and allied products which being less soluble than the normal product of tissue change (urea) favor the formation of stone.

A disorder which causes a decrease in the functions of the lungs may cause an excess of acid (hippuric) and allied bodies, or of oxalic acid or sugar in the urine, which will irritate the kidneys even if they do not produce solid deposits in the urinary passages.

A disease of the nervous system, especially those that affect the base of the brain and spinal cord, may induce a urinary disorder prominent among them are diabetes, albumenaria, and chylous urine.

A disease that causes imperfect nutrition or a destruction of the bony tissues, causes a deposit of phosphates of lime and magnesia, in the urine. This may lead to the formation of stone and gravel.

An extended inflammation or an acute fever will lessen the liquids of the urine, while the solids (waste products) are increased, and the overcharged urine is irritating to the urinary organs, or the waste products not being taken out by the action of the kidneys will poison the system.

Feeding green vegetables covered with hoar-frost or furnishing an excess of food rich in phosphates (wheat bran, beans, pease, vetches, lentils, rape-cake, cotton-seed cake) or a privation of water which entails a concentrated condition and high density of the urine may irritate the

kidneys. Exposure in cold rain or snow storms, cold draughts of air, and damp beds are liable to further disorder an already overworked or irritable kidney.

Examination of the Urine. In some cases the changes of the urine are the only signs of disease that can be detected. Of these changes the following may be looked for :

COLOR—White from deposits of salts of lime; brown or red from blood-clots or coloring matter; yellow or orange from bile or blood-pigment; pale from excess of water. In giving medicine remember santonin makes it red; senna and rhubarb, brown; tar and carbolic acid, green.

DENSITY—The horse's urine may be 1.030 to 1.050, but it may greatly exceed this in diabetes and may sink to 1.007 in diuresis.

CHEMICAL RE-ACTION—as ascertained by blue litmus or red test papers. The horse on vegetable diet has alkaline urine turning red test papers blue, while in the sucking-colt and the horse fed on flesh or on his own tissues (in starvation or abstinence during disease) it is acid, turning blue litmus red.

ORGANIC CONSTITUENTS—as when glairy from albumen coagulable by strong nitric acid and boiling, when charged with microscopic casts of the uriniferous tubes, with the eggs or bodies of worms, with sugar, blood, or bile.

IN ITS SALTS—which may crystalize out spontaneously, or on boiling, or on the addition of chemical re-agents.

Saccharine Diabetes or Glycosuria. This disease is also called Diabetes Mellitus and Inosuria. This is primarily a disease of the nervous system or liver rather than of the kidneys, but since the most prominent symptom is the sweet urine it may be treated under this head. Its **CAUSES** are varied, but are chiefly disorder of the liver and disorder of the brain. One of the most prominent functions of the liver is the formation of glycogen, a principle allied to grape-sugar, and the passing of it into the blood for further oxidation. This is a constant function of the liver, but in health the resulting sugar is chemically destroyed in the circulation and does not appear in the urine. On the contrary, when the supply of oxygen is defective, as in certain cases of the lungs, the whole of the sugar does not undergo combustion and the excess is given off by the kidneys. Also in certain forms of enlarged liver the amount of sugar produced is more than can be disposed off in the natural way, and it appears in the urine. A temporary sweetness of the urine often occurs after a hearty meal on starchy food, but this is due altogether to

the superabundant supply of the sugar-forming food, and last for a few hours only, and has no significance. In many cases of fatal glycosuria the liver is found to be enlarged, or at least congested, and it is found that the disorder can be produced experimentally by agencies which produce an increased circulation through the liver. Certain chemical poisons also cause saccharine urine, notably woorara, strychnia, morphia, phosphoric acid, alcohol, ether, chloroform, quinia, ammonia, and arsenic.

Symptoms. These are ardent thirst and profuse secretion of a pale urine of a high density (1.060 and upward), rapid loss of condition, scurfy, unthrifty skin, costiveness or irregularity of the bowels, indigestion, and the presence in the urine of a sweet principle, grape-sugar, or inosite, or both. This may be most promptly detected by touching the tip of the tongue with a drop. Sugar may be detected simply by adding a tea-spoonful of liquid yeast to four ounces of the urine and keeping it lightly stopped at a temperature of 70° to 80° F., for twelve hours, when the sugar will be found to have been changed into alcohol and carbon dioxide. The loss of density will give indication of the amount of sugar transformed; thus a density of 1.035 in a urine which was formerly 1.060 would indicate about fifteen grains of sugar to the fluid ounce.

Inosite or muscle-sugar, frequently present in the horse's urine, and even replacing the glucose, is not fermentable. Its presence may be indicated by its sweetness and the absence of fermentation, or by Gallois' test. Evaporate the suspected urine at a gentle heat almost to dryness, then add a drop of a solution of mercuric nitrate and evaporate carefully to dryness, when a yellowish residue is left that is changed on further cautious heating to a deep rose-color, which disappears on cooling and re-appears on heating.

In advanced diabetes, dropsies in the limbs and under the chest and belly, puffy, swollen eyelids, cataracts, catarrhal inflammation of the lungs, weak, uncertain gait, and drowsiness may be noted.

Treatment. This is most satisfactory in cases dependent on some curable disease of liver, pancreas, lungs, or brain. Thus, in liver disease, a run at pasture in warm weather, or in winter a warm, sunny, well-aired stable, with sufficient clothing and sulphate of soda, one ounce daily as a laxative, and carbonate of potassium, one-fourth ounce as an alkali, may benefit. To this may be added mild blistering, cupping, or even leeching over the last ribs. Diseases of the brain or pancreas may be treated according to their indications. The diet should be mainly

albuminous, such as wheat-bran or middlings, pease, beans, and milk. Indeed, an exclusive milk diet is one of the very best remedial agencies. It may be given as skim milk or butter-milk, and in the last case combines an anti-diabetic remedy in the lactic acid. Under such an exclusive diet recent and mild cases are often entirely restored, though at the expense of an attack of rheumatism. Codeine, one of the alkaloids of opium, is strongly recommended by Dr. Tyson. The dose for the horse would be three grains thrice daily. In cases in which there is manifest irritation of the brain bromide of potassium, four drams, or ergot, one-half ounce, may be resorted to. Bitter tonics (especially nuxvomica, one-half dram) are useful in improving digestion and general health.

Excessive Secretion of Urine, or Diabetes Insipidus. This disease is also known as diuresis or polyuria. It consists in an excessive secretion of a clear, watery urine of a low specific gravity (1.007) with a correspondingly ardent thirst, a rapidly advancing emaciation, and great loss of strength and spirit.

Causes. It may be caused by any agent, medicinal, alimentary, or poisonous, which unduly stimulates the kidneys; the reckless administration of diuretics, which form such a common constituent of quack horse-powders; acrid diuretic plants in grass or hay; new oats still imperfectly cured; an excess of roots or other very watery food; a full allowance of salt to animals that have become inordinately fond of it; but, above all, feeding on hay, grain, or bran which has not been properly dried and has become musty and permeated by fungi. Thus hay, straw, or oats secured in wet seasons and heating in the stack is especially injurious. Hence this malady, like (sleepy staggers), is widespread in wet seasons, and especially in rainy districts.

Symptoms. The horse drinks deep at every opportunity and passes urine on every occasion when stopped, the discharge being pale, watery, of a low density, and inodorous; in short, it contains a great excess of water and a deficiency of the solid excretions. So great is the quantity passed, however, that the small amount of solids in any given specimen amounts in twenty-four hours to far more than the normal, a fact in keeping with the rapid wasting of the tissues and extreme emaciation. The flanks become tucked up, the fat disappears, the bones and muscles stand out prominently, the skin becomes tense and hidebound, and the hair erect, scurfy, and deficient in luster. The eye becomes dull and sunken, the spirits are depressed, the animal is weak and sluggish,

sweats on the slightest occasion, and can endure little. The subject may survive for months, or he may die early of exhaustion. In the slighter cases, or when the cause ceases to operate, he may make a somewhat tardy recovery.

Treatment. This consists in stopping the ingestion of the faulty drugs, poisons or food, and supplying sound hay and grain free from all taint of heating or mustiness. A liberal supply of boiled flaxseed in the drinking water at once serves to eliminate the poison and to sheath and protect the irritated kidneys. Tonics like sulphate or phosphate of iron (two drams morning and evening) and powdered gentian or Peruvian bark (four drams) help greatly by bracing the system and hastening repair. To these may be added agents calculated to destroy the fungus and eliminate its poisonous products. In that form which depends on musty food nothing acts better than large doses of iodide of potassium (two drams), while in other cases creosote, carbolic acid (one dram), or oil of turpentine (four drams) properly diluted, may be resorted to.

Poisoning by Albuminoids or Hæmoglobinuria. Also known as azoturia or anazoturia. This is commonly supposed to be a disease of the kidneys, because the prominent symptoms are ropy and dark-colored urine and loss of control over the hind limbs; but it is rather a disease of the liver and blood-forming functions. This disease is never seen at pasture, rarely when the animal has constant daily work. It is connected with high feeding, especially food rich in nitrogen, such as oats, beans, and cotton-seed meal, and is made to show itself by taking the horse from the stable and subjecting it to work. The poison does not seem to be diffused, when starting, as the horse is usually lively and spirited, but within the first quarter or half mile it usually succumbs.

This disease is peculiar to solipeds. In all others the portal veins have no communication with the vena cava (SEE MANIKIN OF THE HORSE) except through the capillaries of the liver, but in the solipeds there is a persistence through life of a condition common to foetal mammals, of several good-sized veins leading directly from the veins of the stomach and intestines (portal veins) into the posterior vena cava and heart. By the accelerated breathings there seems to be drawn directly into the blood the stored up nitrogenous matter in an imperfectly oxidized condition, thus rendering the blood unable to retain the healthy functions of the nerve centers and muscles.

Symptoms. In the milder forms this affection may appear as a lameness in one limb, from indefinite cause, succeeding to some sudden exertion and attended by a dusky-brown color of the membranes of the eye and nose and some wincing when the last ribs are struck. The severe forms come on after one or two days of rest on a full ration, when the animal has been taken out and driven one hundred yards or more. The fire and life with which he had left the stable suddenly give place to dullness and oppression, as shown in heaving flanks, dilated nostrils, pinched face, perspiring skin, and trembling body. The muscles of the loins or haunch become swelled and rigid, the subject moves stiffly or unsteadily, crouches behind, the limbs are carried half doubled, and he soon drops, unable to support himself. When down, the body and limbs are moved convulsively, but there is no power over the movement in the muscles. The pulse and breathing are quickened, the eyes red with a tinge of brown, and the urine, if passed, is seen to be highly colored, dark brown, red, or black, but it contains neither blood clots nor globules. The color is mainly due to hæmoglobin and other imperfectly elaborated constituents of the blood.

It may end fatally in a few hours or days, or a recovery may ensue, which is usually more speedy and perfect if it has set in at an early stage. In the late and tardy recoveries a partial paralysis of the hind limbs may last for months.

Prevention. To avoid this serious affection, restrict the diet and give daily exercise when the animal is not at work. A horse that has had one attack should never be left idle for a single day in the stall or barn-yard. When a horse has been condemned to absolute repose on good feeding he may have a laxative (one-half to one pound Glauber salts), and have exercise, beginning with a short walk and increasing day by day.

Treatment. In mild cases give a laxative, graduated daily exercise, and a daily dose of saltpeter (one ounce). Sudden attacks will sometimes promptly subside if taken on the instant and the subject kept still and calmed by a dose of bromide of potassium (four drams) and sweet spirits of niter (one ounce). The latter has the advantage of increasing the secretion of the kidneys. In severe cases, as a rule, it is desirable to begin treatment by a full dose of aloes (four to six drams) with the above-named dose of bromide of potassium, and this latter may be continued at intervals of four or six hours, as may be requisite to calm the nervous excitement. Fomentations with warm water over the loins are

always useful in calming the excitable condition of the spinal cord, muscles, liver, and kidneys, and also in favoring secretion from the two latter. On the second day give diuretics, such as saltpeter, one-half ounce, and powdered colchicum, one-half dram, to be repeated twice daily. A laxative may be repeated in three or four days should the bowels seem to demand it, and as the nervous excitement disappears any remaining muscular weakness or paralysis may be treated by one-half dram doses of *nux vomica* twice a day and a stimulating liniment (*aqua ammonia* and sweet-oil in equal proportions) rubbed on the torpid muscles.

During the course of the disease friction to the limbs is useful. When the patient can not stand he must have a thick, soft bed, and should be turned from side to side at least twelve hours. As soon as he can be made to stand he may be helped up and even SUPPORTED in a sling.

Chronic Inflammation of the Kidneys. Chronic inflammation of the kidneys is more commonly associated with albumen and casts in the urine than the acute form, and in some instances these conditions of the urine may be the only prominent symptoms of the disease. Though it may follow blows, injuries, and exposures, it is much more commonly connected with faulty conditions of the system, such as indigestion, heart disease, lung or liver disease, imperfect blood formation or assimilation. In short, it is rather the attendant on a constitutional infirmity than on a simple local injury.

It may be associated with various forms of diseased kidney, as shrinkage (atrophy), increase (hypertrophy), softening, red congestion, white enlargement, etc., so that it forms a group of diseases rather than a disease by itself.

Symptoms. There may be stiffness, weakness, and increased sensibility of the loins, and modified secretion of urine (increase or suppression) or the flow may be natural. Usually it contains albumen, the amount furnishing a fair criterion of the gravity of the affection, and microscopic casts, also most abundant in bad cases. Dropsy shown by swelled legs, is a significant symptom, and if the dropsy takes place along the lower line of the body, or in chest or abdomen, the significance is increased. A scurfy, unthrifty skin, lack-luster hair, inability to sustain severe or continued exertion, poor or irregular appetite, loss of fat and flesh, softness of the muscles, and pallor of the eyes and nose are equally suggestive. So are skin eruptions of various kinds. Any

one or more of these symptoms would warrant an examination of the urine for albumen and casts, the finding of which signifies renal inflammation.

Treatment. This is not always satisfactory, as the cause is liable to be maintained in the disorders of important organs elsewhere. If any such disease of another organ or function can be detected, that should be treated first or simultaneously with this affection of the kidneys. In all cases the building up of the general health is important. Hence a course of tonics may be given (phosphate of iron, two drams; nux vomica, twenty grains; powdered gentian root, four drams, daily), or sixty drops of sulphuric acid or nitro-muriatic acid may be given daily in the drinking water. If there is high temperature of the body and tenderness of the loins, fomentations may be applied, followed by a mustard pulp as for acute inflammation, and even in the absence of these symptoms the mustard may be used with advantage at intervals of a few days. In suppression of urine, fomentations with warm water or with infusion of digitalis leaves is a safer resort than diuretics, and cupping over the loins may also benefit. To apply a cup shave the skin and oil it; then take a narrow-mouthed glass, rarify the air within it by introducing a taper in full flame for a second, withdraw the taper and instantly apply the mouth of the glass to the skin and hold it closely applied till the cooling tends to form a vacuum in the glass and to draw up the skin, like a sucker.

As in the acute inflammation, every attention must be given to secure warm clothing, a warm stall, and pure air.

Bloody Urine or Hæmaturia. Bloody urine in the horse is usually the result of injuries, as sprains and fractures of the loins, lacerations of the sub-lumbar muscles, irritation caused by stone in the kidney, ureter, bladder, or urethra. Bloody urine may occur with acute congestion of the kidney, with tumours in its substance, or diseased growth in the bladder. The presence in the food of acrid diuretic plants may lead to the escape of blood from the kidney. The horse is not as predisposed to Bloody Urine as the ox or sheep, the reason is that there is greater plasticity of the horse's blood in connection with the larger quantities of fibrine. If the blood comes from the kidneys it is likely to be found diffused through the urine, while if it comes from the bladder or urinal-passages it is usually present in blood clots. Again if the blood comes from the kidney, the microscope will reveal minute cylindrical blood clots surrounding blood-globules. The location of the in-

jury may be better ascertained by observing whether there is sprain of the loins, stone, or tumour of the bladder or urethra.

Treatment. Since the disease is mainly due to direct injury, the cause should be removed if possible, and then general and local syptics should be applied. Irritants in the food must be avoided; if from sprain, give it proper treatment; if stone in the bladder or urethra it should be removed. Give freely of slippery-elm or linseed tea, and doses of the following : three drams of tincture of chloride of iron; one-half dram of the acetate of lead; one-half dram of tannic acid; or one ounce of the oil of turpentine. If the bloody discharge is considerable in quantity apply cold water to the loins and keep the animal very quiet.

Acute Inflammation of the Kidneys or Acute Nephritis.

The inflammations of the kidneys have been variously divided according to their varying symptoms and conditions, but for ordinary utility it is sufficiently extended to divide into ACUTE and CHRONIC.

CAUSES. The causes of inflammation of the kidneys are varied and the congestion may be the result of any of the following :

1. Altered and irritant products passing through the kidneys during inflammation of other organs, and during fevers. The inflammation may last during the existence of the cause, or may continue and become aggravated.

2. The blood-pressure being thrown back on the veins and kidneys as a result of heart disease.

3. The escape of urine from the kidney being prevented by disease of the ureter or bladder, thereby causing increased fullness in the pelvis and tubes of the kidney.

4. When urine is detained in the kidneys from any cause, it becomes decomposed and produces ammonia and irritants.

5. The advance of bacteria from the bladder to the kidney through the ureter.

6. The receiving into the body with hay or other fodder acrid or irritating plants, including fungi.

7. The absorption of cantharidine from a surface blistered by Spanish flies, (cantharides); the reckless giving of diuretics; the presence of calculi (stones) in the kidney; exposure to cold and wet; and blows on the loins or sprains.

8. Liver disorders which throw on the kidneys the work of excreting irritating products.

Symptoms. These are more or less fever; stiffness of the back and a straddling gait with the hind legs; evident difficulty in lying down and rising; the animal will sometimes groan with pain if compelled to walk in a circle; arching of the loins and tucking up of the flanks; looking back at the belly as if there were colicky pains, and tenderness of the loins to pinching, especially just beneath the bony process six inches from the median line, (See manikin for location of kidneys, and also page 60 the last four lines of STUDY OF SYMPTOMS.)

Urine is passed frequently, a small quantity at a time, of a high color, and sometimes mixed with blood or even pus. Under the microscope it shows microscopic casts. The legs tend to swell from the foot up, also the dependent parts beneath the belly, and chest, and effusions of liquid may occur within the chest or abdomen. In the male animal the alternate drawing up and relaxation of the testicles in the scrotum are suggestive, and in small horses the oiled hand introduced into the rectum may reach the kidney and ascertain its sensitiveness.

Treatment. This consists in removing any cause that may be recognized. Then, if the suffering and fever are high, two or four quarts of blood may be abstracted from the jugular vein; in weak subjects unless in high fever this should be omitted. Next relieve the kidneys as far as possible by throwing their work on the bowels and skin. A pint of castor oil is less likely than either aloes or salts to act on the kidneys. To affect the skin a warm stall and heavy clothing may be supplemented by dram doses of Dover's powder. (Dover's Powder consists of sixty grains ipecac in No. 60 powder, sixty grains powdered opium, four hundred eighty grains sugar of milk in No. 30 powder). Boiled flaxseed may be added to the drinking water, and also thrown into the rectum as an injection, and blankets saturated with hot water should be persistently applied to the loins. This may be followed by a very thin pulp of the best ground mustard made with tepid water, rubbed in against the direction of the hair, and covered up with paper and a blanket. This may be kept on for an hour, or until the skin thickens and the hair stands erect. It may then be rubbed or sponged off and the blanket re-applied. When the action of the bowels has been started it may be kept up by a daily dose of two or three ounces of Glauber salts.

During recovery a course of bitter tonics (nux vomica one scruple, ground gentian root four drams), should be given. The patient should also be guarded against cold, wet, and any active exertion for some time after all active symptoms have subsided.

CHAPTER IX

GALLS AND BRUISES.

Their Effects and How to Avoid Them.

ABSCESSSES OR BOILS CAUSED BY CONTUSION, BRUISES AND THEIR TREATMENT, CHAFING BY THE HARNESS, AND SADDLE OR COLLAR GALLS, ETC.

WOUNDS and bruises often produce inflammation as a result of the injury of the affected part. If the wound is a puncture of some joint as the hock, fetlock, or knee, often there is discharged a thin, whitish or yellowish fluid, called joint-oil, or joint-water. If it is a bruise it often causes abscesses or the accumulation of pus. If it is caused by a continued rubbing, (chafing) it often leads to sores that are hard to heal, and even when healed the hair often grows in white or there is left a calloused condition of the skin.

Abscesses. These consist of accumulations of pus within circumscribed walls, at different parts of the body, and may be classed as acute, and cold or chronic abscesses.

Acute abscesses follow as the result of local inflammation in glands, muscular tissue, or even bones. They are very common in the two former. The abscesses most commonly met with in the horse (and the ones which will be here described) are those of the salivary glands, occurring during the existence of "strangles" or "colt distemper." The glands behind or under the jaw are seen to slowly increase in size, becoming firm, hard, hot, and painful. At first the swelling is uniformly hard and resisting over its entire surface, but in a little while

becomes soft (fluctuating) at some portion, mostly in the center. From this time on the abscess is said to be "pointing" or "coming to a head," which is shown by a small elevated or projecting prominence, which at first is dry, but soon becomes moist with transuded serum. The hairs over this part loosen and fall off, and in a short time the abscess opens, the contents escape, and the cavity gradually fills up—heals by granulations.

Abscesses in muscular tissue are usually the result of bruises or injuries. In all cases where abscesses are forming we should hurry the ripening process by frequent hot fomentations and poultices. When they are very tardy in their development a blister over their surface is advisable. It is a common rule with surgeons to open an abscess as soon as the pus can be plainly felt, but this practice can scarcely be recommended to owners of stock indiscriminately, since this little operation frequently requires an exact knowledge of anatomy. It will usually be found the better plan to encourage the full ripening of an abscess and allow it to open of itself. This is imperative if the abscess is in the region of joints, etc. When open, we must not squeeze the walls of the abscess to any extent. They may be very gently pressed with the fingers at first to remove the clots (inspissated pus) but after this the orifice is simply to be kept open by the introduction of a whalebone probe, should it be disposed to heal too soon.

If the opening is at too high a level another should be made into the lowest portion of the abscess. Hot fomentations or poultices are sometimes required for a day or two after an abscess has opened, and are particularly indicated when the base of the abscess is hard and indurated. As a rule, injections into the cavity of abscesses are not indicated, though in cases of serous abscesses (if one may be allowed such latitude of terms), as cysts of the elbow, knee, etc., astringent injections (sulphate of zinc, fifteen grains to the ounce of water) are required to cause adhesions of the walls of the cavity and prevent it from refilling. If abscesses are foul and bad-smelling their cavities must be syringed with a weak solution of carbolic acid or other antiseptics.

Cold abscess is the term applied to those large, indolent swellings that are the result of a low or chronic form of inflammation, in the center of which there is a small collection of pus. These are mostly met with at the base of the neck and in front of the shoulder joint. The swelling is diffuse and of enormous extent, but slightly hotter than surrounding

parts, and not very painful upon pressure. There is a pronounced stiffness, rather than pain, evinced upon moving the animal. Such abscesses have the appearance of a hard tumor, surrounded by a softer oedematous swelling, involving the tissues to the extent of a foot or more in all directions from the tumor. This diffused swelling gradually subsides and leaves the large, hardened mass somewhat well defined. One of the characteristics of cold abscesses is their tendency to remain in the same condition for a great length of time. There is neither heat nor soreness; no increase nor lessening in the size of the tumor; it remains *statu quo*. If, however, the animal should be put to work for a short time the irritation of the collar causes the surrounding tissues to again assume an oedematous condition, which, after a few days' rest, disappear, leaving the tumor as before or but slightly larger. Upon careful manipulation we may discover what appears to be a fluid deep seated in the center of the mass. The quantity of matter so contained is very small (often not more than a tablespoonful) and for this reason it can not in all cases, be detected.

Cold abscesses are mostly, if not always, caused by the long-continued irritation of a loose and badly fitting collar. There is a slow inflammatory action going on, which results in the formation of a small quantity of matter, inclosed in very thick and but partially organized walls, that are not as well defined as is the circumference of fibrous tumors, which they most resemble.

Treatment. The means recommended to bring the acute abscess "to a head" are but rarely effectual with this variety; or, if successful, too much time has been occupied in the cure. We must look for other and more rapid methods of treatment. These consist in, first of all, carefully exploring the tumor for the presence of pus. The incisions must be made over the softest part, and carried deep into the tumor (to its very bottom if necessary), and the matter allowed to escape. After this, and whether we have found matter or not, we must induce an active inflammation of the tumor in order to promote solution of the thick walls of the abscess. This may be done by inserting well into the incision a piece of oakum or cotton saturated with turpentine, carbolic acid, tincture of iodine, etc., or we may pack the incision with powdered sulphate of zinc and keep the orifice plugged for twenty-four hours. These agents set up a destructive inflammation of the walls. Suppuration follows, and this should now be encouraged by hot fomentations and poultices. The orifice must be kept open, and should it be dis-

posed to neal we must again introduce some of the agents above described. A favored treatment with many, and it is probably the best, is to plunge a red-hot iron to the bottom of the incision, and thoroughly sear all parts of the walls of the abscess. This is to be repeated after the first slough has taken place, if the walls remain thickened and indurated.

It is useless to waste time with fomentations, poultices, or blisters in the treatment of cold abscesses, since, though apparently removed by such methods, they almost invariably return again when the horse is put to work. Extirpation by the knife is not practical, as the walls of the tumor are not sufficiently defined. If treated as above directed, and properly fitted with a good collar after healing, there will not remain any track, trace, or remembrance of the large, unsightly mass.

Bruises. These are nothing but contused wounds, where the skin has not been ruptured. There is often considerable solution of continuity of the parts under the skin, subcutaneous hemorrhage, etc., which may result in local death (mortification) and slough of the bruised part. If the bruise or contusion is not so severe, very many cases are quickly cured by constant fomentation with hot water for from two to four hours. The water should be allowed, about this time, to gradually become cool and then cold. Cold fomentation must then be kept up for another hour or two. Dry the parts thoroughly and quickly, and bathe them freely with camphor one ounce, sweet oil eight ounces. A dry, light bandage should then be applied, the horse allowed rest, and, if necessary, the camphorated oil may be repeated for two or three days. If, however, the wound is so severe that sloughing must ensue, we must encourage this by poultices made of linseed meal, wheat bran, turnips, onions, bread and milk, or hops. Charcoal is to be sprinkled over the surface of the poultice when the wound is bad smelling. After the slough has fallen off the wound is to be dressed with antiseptic washes of carbolic acid, chloride or zinc, permanganate of potash, etc.. If granulating (filling up) too fast, use burnt alum; or air-slaked lime. Besides this local treatment we find that the constitutional symptoms of fever and inflammation call for measures to prevent or control them. This is best done by placing the injured animal on soft or green food. A physic of Barbadoes aloes, one ounce, should be given as soon as possible, after the accident. Sedatives, as tincture of aconite root, fifteen

drops every two or three hours, and ounce doses of saltpeter twice or three times a day, are also to be administered.

When the symptoms of fever are abated, and if the discharges from the wound are abundant, the strength of our patient must be supported by good food and tonics. One of the best tonics is as follows: Powdered sulphate of iron, powdered gentian, and powdered ginger, of each four ounces. Mix thoroughly and give a heaping table-spoonful twice a day on the feed, or as a drench.

Chafing by the Harness and Saddle or Collar Galls. Wounds or abrasions of this description are very commonly met with during the spring plowing, particularly in "new ground," or from ill-fitting saddles or collars at any time of the year. Collars too large or too small are equally productive of this trouble. In the spring of the year, when the horse has been unused to steady work for some months, the skin is tender and easily abraded. The horse, from being wintered on a scanty allowance of grain, is soft, sweats easily; and if the collar and shoulders are not properly attended to, chafing of the skin is almost sure to follow. The harness should be repaired, cleaned, and oiled before using, and the collar in particular should be thoroughly cleansed after every day's use. The shoulders are to be frequently washed with cold water, and afterward bathed with white-oak bark tea, alcohol, or other astringents. Should ill-feeling or badly made harness or saddles gall a horse, they must be refitted at once, or laid aside for other and better ones.

Treatment. The remedy for such abrasions is simple and effective if the cause be removed without delay. The parts must be thoroughly bathed in soapy water, allowing the lather to remain on the abraded surface. There are many remedies for harness galls. Among them may be mentioned alcohol, one pint, in which are well shaken the whites of two eggs, a solution of nitrate of silver, ten grains to the ounce of water; sugar of lead or sulphate of zinc, twenty grains to an ounce of water; carbolic acid, one part in fifteen parts of glycerine, and so on almost without end. Any simple astringent wash or powder will effect a cure provided the sores are not irritated by friction. If the animal must continue his work the harness must be padded or chambered.

Lacerated and Contused Wounds. These may be described together, although there is of course this difference, that in contused wounds there is no break or laceration of the skin. Lacerated wounds,

however, are as a rule also contused; the surrounding tissues to a greater or lesser extent. While such wounds may not appear at first sight to be lacerations and contusions, when extensive, are always to be regarded as dangerous. Many horses die from septic infection or mortification as a result of these injuries. We find in severe contusions an infiltration of blood into the surrounding tissues; disorganization and mortification follow, and involve often the deeper seated structures.

In wounds that are lacerated the amount of hemorrhage is mostly inconsiderable; even very large blood vessels are thus torn apart without inducing a fatal result. The edges of the wound are ragged and uneven. These wound are produced by some blunt object, as where a horse runs against fences, board piles, the corners of buildings, or where he is struck by the pole or shafts of another team, falling on rough, irregular stones, etc.

Treatment. In lacerated wounds great care must at first be exercised in examining or probing to the very bottom of the rent or tear to see if any foreign body be present. Very often splinters of wood or bits of stone or dirt are thus lodged, and unless removed prevent the wound from healing; or if it should heal the wound soon opens again, discharging a thin, gluey matter that is characteristic of the presence of some object in the parts. After a thorough exploration these wounds are to be carefully and patiently fomented with warm water, to which has been added carbolic acid in the proportion of one part to one hundred of water. Rarely, if ever, are stitches to be inserted in lacerated wounds. The surrounding tissues and skin are so weakened in vitality and structure by the contusion that stitches will not hold; they only irritate the parts. It is better to endeavor to secure coadaptation by means of bandages, plasters, or collodion. One essential in the treatment of lacerated wounds is to secure a free exit for the pus. If the orifice of the wound is too high, or if the pus is found to be burrowing in the tissues beneath the opening, we must then make a counter opening as low as possible. This will admit of the wound being thoroughly washed out, at first with warm water, and afterward injected with some mild astringent and antiseptic wash, as chloride of zinc, one dram to a pint of water. A depending opening must be maintained until the wound ceases to discharge. Repeated hot fomentations over the region of lacerated wounds afford much relief and should be persisted in.

CHAPTER X.

GENERAL DISEASES.

Their Causes, Symptoms and Treatment.

INFLUENZA, PINK-EYE OR EPIZOOTY, STRANGLES, DISTEMPER OR CATARRHAL FEVER, PLEURO-PNEUMONIA, HORSE-POX, AND RABIES.

AMONG the diseases to which horse flesh is heir, there are a few that may be better classed as general diseases than as diseases of any set of organs. While their symptoms show that one set of organs may be more affected by the diseases than another it has been the custom among veterinarian writers to class them as general diseases. Among these may be mentioned inflammations that are general in their attacks, and a few of our contagious diseases. If the inflammation is confined to one class of organs or one organ of the class it has been described under its proper head.

Influenza, Pink-Eye, or Epizooty. This is a contagious and infectious specific fever of the horse, ass, and mule, with alterations of the blood, stupefaction of the brain and nervous system, great depression of the vital forces and frequent inflammatory complications of the important vascular organs, especially of the lungs, intestines, brain, and laminæ of the feet. One attack usually protects the animal from future ones of the same disease, but not always. An apparent complete recovery is sometimes followed by serious sequelæ of the nervous and blood-vessel systems. The disease is very apt, under certain conditions of the atmosphere or from unknown causes, to assume an epizootic form, with tendency to complications of especial organs, as, at one period the lungs, at another the intestines, etc.

In 1766 it first attacked the horses in North America, but is not described as again occurring in a severe form until 1870-1872, when it spread over the entire country, from Canada south to Ohio, and then eastward to the Atlantic and westward to California. It is now a permanent disease in our large cities, selecting for the continuance of its virulence young or especially susceptible horses which pass through the large and ill-ventilated and uncleaned dealers' stables and assumes, from time to time an enzootic form, as from some reason its virulence increases, or as from reasons of rural economy and commerce large numbers of young and more susceptible animals are exposed to its contagion.

As one attack is self-protective, numbers of old horses, having had an earlier attack, are not capable of contracting it again; but, aside from this, young horses, especially those about four or five years of age, are much more predisposed to be attacked, while the older ones, even if they have not had the disease, are less liable to it. Again, the former age is that in which the horse is brought from the farm where it has been free from the risk of contamination, and is sold to pass through the stables of the country taverns, the dirty, infected railway cars, and the foul stockyards and damp dealers' stables of our large cities. Want of training is a predisposing cause. Overfed, fat young horses, which have just come through the sales' stables, are much more susceptible to contagion than the same horses are after a few months of steady work.

The atmosphere is the most common carrier of the infection from sick animals to healthy ones, and through it it may be carried for a considerable distance. The contagion will remain in the straw bedding and droppings of the animal, and in the feed in an infected stable, for a considerable time, and if these are removed to other localities it may be carried in them. It may be carried in the clothing of those who have been in attendance on horses suffering from the disease. The drinking water in troughs and even running water may hold the virus and be a means of its communication to other animals even at a distance. Brick walls, old woodwork, and the dirt which is too frequently left about the feed boxes of a horse stall, will all hold the contagion for some days, if not weeks, and communicate it to susceptible animals when placed in the same locality.

Terminations. The termination of simple influenza may be death by extreme fever, with failure of the hearts' action; from excessive

coma, due generally to a rapid congestion of the brain; to the poisonous effects of the debris of the disintegrated blood corpuscles; to an asphyxia, following congestion of the lungs; or the disease terminates by subsidence of the fever, return of the appetite and nutritive functions of the organs, and rapid convalescence; or, in an unfortunately large number of cases, the course of the disease is complicated by local inflammatory troubles, whose gravity is greater in influenza than it is when they occur as sporadic diseases.

Symptoms. After the exposure of a susceptible horse to infection a period of incubation of from five to seven days elapses, during which the animal seems in perfect health, before any symptom is visible. When the symptoms of influenza develop they may be intense or they may be so moderate as to occasion but little alarm, but the latter condition frequently exposes the animal to use and to the danger of the exciting causes of complications which would not have happened had the animal been left quietly in its stall in place of being worked. The disease may run its simple course as a specific fever, with alterations of the blood, or it may become at any period complicated by local inflammatory troubles, the gravity of which is augmented by developing in an animal with an impoverished blood and already irritated and rapid circulation and defective nutritive and reparative functions.

The first symptoms are those of a rapidly developing fever, which becomes intense within a very short period. The animal becomes dejected and inattentive to surrounding objects; stands with its head down and not back on the halter as in serious lung diseases. It has chills of the flanks, the muscles of the croup, and the muscles of the shoulders, or of the entire body, lasting from fifteen to thirty minutes, and frequently a grinding of the teeth which warns one that a severe attack may be expected. The hairs become dry and rough and stand on end. The body temperature increases to 104° , $104\frac{1}{2}^{\circ}$, and 105°F. , or even in severe cases to 107°F. , within the first twelve or eighteen hours. The horse becomes stupid, stands immobile with its head hanging, the ears listless, and it pays but little attention to the surrounding attendants or the crack of a whip. The stupor becomes rapidly more marked, the eyes become puffy and swollen with excessive lacrymation, so that the tears run from the internal canthus of the eye over the cheek and may blister the skin in its course. The respiration becomes accelerated to twenty-five or thirty in a minute, and the pulse is quickened to seventy, eighty, or even one hundred, moderate in volume and in force. There is

great depression of muscular force; the animal stands limp as if excessively fatigued. There is diminution, or in some cases total loss, of sensibility of the skin, so that it may be pricked or handled without attracting the attention of the animal. On movement, the horse staggers and shows a want of coordination of all of the muscles of its limbs. The senses of hearing, sight, and taste are diminished, if not entirely abolished. The visible mucous membranes (as the conjunctiva), from which it is known as the "pink eye," and the mouth and the natural opening become of a deep saffron, ocher, or violet-red color. This latter is especially noticeable on the rims of the gums and is a condition not found in any other disease, so that it is an almost diagnostic symptom. If the animal is bled at this period the blood is found more coaguable than normal, but at a later period it becomes of a dark color and less coaguable. There is great diminution or total loss of appetite with an excessive thirst, but in many cases in cold-blooded horses the animal may retain a certain amount of appetite, eating slowly at its hay, oats, or other feed.

Complication of the Lungs. If at any time during the course of the fever the animal is exposed to cold or draughts of air, or in any other way to the causes of repercussion, the lungs may be affected. In the majority of cases; however, after three, four, or five days of the fever, the congestion of the lungs commences without any exposure or apparent exciting cause. This is due to the alteration of the blood, which allows a more easy osmosis of the blood into the surrounding tissues and to the checking of the capillary blood vessels, produced by the increased rapidity and force of the circulation. Unless this congestion of the lungs is relieved at once it is followed by an inflammatory product, a fibrinous pneumonia. The pneumonia, while it is in its essence the same, differs from an ordinary pneumonia at the commencement by an insidious course. The animal commences to breath heavily, which becomes distinctly visible in the heaving of the flanks, the dilation of the nostrils, and frequently in the swaying movement of the unsteady body. The respirations increase in number, what little appetite remained is lost, the temperature increases one to two degrees, the pulse becomes more rapid, and at times, for a short period, more tense and full, but the previous poisoning of the specific disease has so weakened the tissues that it never becomes the characteristic full, tense pulse of a simple pneumonia.

On percussion of the chest dullness is found over the inflamed areas;

on auscultation at the back of the neck over the trachea a tubular murmur is heard. The crepitant rales and tubular murmurs of pneumonia are heard on the sides of the chest if the pneumonia is peripheral, but in pneumonia complicating influenza the inflamed portions are frequently disseminated in islands of variable size and are sometimes deep seated, in which case the characteristic auscultory symptoms are sometimes wanting. From this time on the symptoms of the animal are those of an ordinary grave pneumonia, rendered more severe by occurring in a debilitated animal. After resolution, however, and absorption into the lungs convalescence is rapid, and recovery takes place perhaps more quickly than it does in the simple form of the disease. There is a cough, at first hacky and aborted, later more full and moist, when we have a discharge from the nostrils which is muco purulent, purulent, or hemorrhagic.

As in simple pneumonia, this discharge may be "rusty," due to capillary hemorrhages. We find that the blood is thoroughly mixed with the matter, staining it evenly instead of being mixed with it in the form of clots. At the recommencement of the complication the animal may be subject to chills, which may again occur in the course of the disease, in which case, if severe, an unfavorable termination by gangrene may be looked for. If gangrene occurs, ushered in by severe chills, a rapid elevation of temperature, a tumultuous heart, a flaky discharge from the nostrils, and a fetid breath, the symptoms are identical with those which occur in gangrene complicating other diseases.

Complication of the Brain. At any time during the course of the disease, at an early period if the fever has been intense from the outset, but more frequently after three or four days in ordinary cases, a congestion of the brain may occur. The animal, which has been stupid and immobile, becomes suddenly restless, walks forward in the stall until it fastens its head in the corner. If in a box stall and it becomes displaced from its position, it follows the wall with the nose and eyes, rubbing against it until it reaches the corner and again fastens itself. It may become more violent and rear and plunge. If disturbed by the entrance of the attendant or any loud noise or bright light, it will stamp with its fore-feet and strike with its hind-feet, but is not definite in fixing the object which it is resisting, which is a diagnostic point between meningitis and rabies, and which renders the animal with the former disease less dangerous to handle. If fastened by a rope to a stake or

post the animal will wander in a circle at the end of the rope. It wanders almost invariably in one direction, either from the right to left or from left to right in different cases, which is dependent upon a greater congestion of one side of the brain than the other. The pupils may be dilated or contracted, or we may find one condition in one eye and the opposite in the other.

The period of excitement is followed by one of profound coma, in which the animal is immobile, the head hanging and placed against the corner of the stall, the body limp, and the motion, if demanded of the animal, unsteady. Little or no attention will be paid to the surrounding noises, the crack of the whip, or even a blow on the surface of the body. The respiration becomes slower, the pulsations are diminished, the coma lasts for variable time, to be followed by excesses of violence, after which the two alternate, but if severe the period of coma becomes longer and longer until the animal dies of spasms of the lungs or of heart failure. It may die from injuries which occur in the ungovernable attacks of violence.

Treatment. While the appetite remains the patient should have a moderate quantity of sound hay, good oats and bran; or even a little fresh clover, if obtainable, can be given in small quantities. With the first decided symptoms of fever the antipyretics are indicated, of which we have a variable choice. Bleeding in this disease is a questionable treatment, and is only to be employed at the very outset of the disease. In large, strong horses of a sanguinary temperament an abstraction of a few quarts of blood will frequently diminish the stupefaction, lower the temperature, slow the pulse and respiration and, render the course of the disease shorter by twelve or twenty-four hours. In some cases, however, bleeding seems to increase the amount of depression, and it should never be used after the deep ochre color of the mucous membranes show that an extensive disintegration of the blood corpuscles has taken place. Derivatives, in the form of essential oils and mustard poultices, baths of alcohol, turpentine and hot water, after which the animal must be immediately dried and blanketed, serve to wake the animal up from the stupor and relieve the congestion of the internal organs.

This treatment is especially indicated when complication by congestion of the lungs, intestines, or of the brain is threatened. Quinine and salicylic acid in dram doses will lower the temperature, but too continuous use of quinine in some cases increases the after depression. Aconite is especially indicated, as in addition to its action on the circulation it seems

to be almost a specific in certain cases in relieving the congestion of the brain and the nervous symptoms produced by the latter. Iodide of potash reduces the excessive nutrition of the congested organs and thereby reduces the temperature; again, this drug in moderate quantities is a stimulant to the digestive tract and acts as a diuretic, causing the elimination of waste matter by the kidneys. Antimony, in guarded doses of one-half dram to one dram, repeated not more than two or three times, will reduce excessive fever, and can be used with special advantage at the first appearance of complications, but it must be used with care, as it is an irritant to the digestive tract and may produce an intestinal complication, causing a severe diarrhea. Small doses of Glauber salts and bicarbonate of soda, used from the outset, stimulate the digestive tract and prevent constipation and its evil results.

In cases of severe depression and weakness of the heart, digitalis can be used with advantage. At the end of the fever, and when convalescence is established, alcohol in one-half pint doses and good ale in pint doses may be given as stimulants, to these may be added dram doses of turpentine.

In complication of the intestines camphor and asafetida are most frequently used to relieve the pain causing the colics; diarrhea is also relieved by the use of bicarbonate of soda, nitrate of potash, and drinks made from boiled rice or starch, to which may be added small doses of laudanum.

In complication of the lungs iodide of potash and digitalis are most frequently indicated, in addition to the remedies used for the disease itself.

Founder occurring as a complication of fever is difficult to treat. It is, unfortunately, frequently not recognized until inflammatory changes have gone on for some days. If recognized at once, local bleeding and the use of hot or cold water, as the condition of the animal will permit, are most useful, but in the majority of cases the stupefied animal is unable to be moved satisfactorily or to have one foot lifted for local treatment, and the only treatment consists in local bleeding above the coronary bands and the application of poultices.

For congestion of the brain large doses of aconite and small repeated doses of mercury form the ordinary mode of treatment. During convalescence small doses of alkalines may be kept up for some little time, but the greatest care must be used, while furnishing the animal with plenty of nutritious, easily digested food, not to overload the intestinal

tract, causing constipation and consecutive diarrhea. Special care must be taken for some weeks not to expose the animal to cold.

Strangles, Distemper or Catarrhal Fever. This is an infectious disease seen most frequently in young animals, and usually leaving an animal which has one attack protected from future trouble of the same kind. It appears as a fever, lasting for a few days, with formation of matter or pus in the air tubes and lungs, and frequently the formation of abscesses in various parts of the body, both near the surface and in the internal organs. It usually leaves the animal after convalescence perfectly healthy and as good as it was before, but sometimes leaves it a roarer, or is followed by the development of deep-seated abscesses which may prove fatal.

Causes. The cause of strangles is infection by direct contact with an animal suffering from the disease, or indirectly through contact with the discharges from an infected animal, or by means of the atmosphere in which an infected animal has been. There are many predisposing causes which render some animals much more subject to contract the disease than others. Early age, which has given it the popular name of colt-ill, offers many more subjects than the later periods of life do, for the animal can contract the disease but once, and the large majority of adult and old animals have derived an immunity from previous attacks. At three, four, or five years of age the colt, which has been at home, safe on a meadow or a cozy barnyard, far from all intercourse with other animals or sources of contagion, is first put to work and driven to the market town or county fairs to be exposed to an atmosphere or to stables contaminated by other horses suffering from disease and serving as infecting agents. If it fails to contract it there, it is sold and shipped in foul, undisinfected railway cars, to dealers' stables, equally unclean, where it meets many opportunities of infection. If it escapes so far, it reaches the time for heavier work and daily contact on the streets of towns or large cities, with numerous other horses and mules, some of which are sure to be the bearers of the germs of this or some other infectious disease, and at last it succumbs.

The period of the eruption of the last permanent teeth, or the end of the period of development from the colt to an adult horse, at which time the animals usually have a tendency to fatten and be excessively full-blooded, also seems to be a predisposing period for the contraction of this as well as of the other infectious diseases. Thoroughbred colts are very susceptible, and frequently contract strangles at a somewhat earlier age

than those of more humble origin. Mules and asses are much less susceptible and are but rarely affected. Other animals are not subject to this disease, but there is a certain analogy between it and distemper in dogs. After exposure to infection there is a period of incubation of the disease, lasting from two to four days, during which the animal enjoys its ordinary health.

Symptoms. The horse at first is a little sluggish if used, or when placed in its stable, is somewhat dejected, paying but moderate attention to the various disturbing surroundings. Its appetite is somewhat diminished in many cases, while in some cases the animal eats well throughout. Thirst is increased, but not a great deal of water is taken at one time. If a bucket of water is placed in the manger, before the patient, it will dip its nose into it and swallow a few mouthfuls, allowing some of it to drip back, and then stop, to return to it in a short time. The coat becomes dry and the hairs stand on end. At times the horse will have chills of one or the other leg, the fore-quarters or hind-quarters, or in severe cases of the whole body, with trembling of the muscles, dryness of the skin, and its hairs standing on end.

If the eyes and mouth are examined the membranes are found reddened to a bright rosy color. The pulse is quickened and the breathing may be slightly accelerated. At the end of a couple of days a cough is heard and a discharge begins to come from the nostrils. This discharge is at first watery; it then becomes thicker, somewhat bluish in color, and sticky, and finally it assumes the yellowish color of matter and increases greatly in quantity.

At the outset the colt may sneeze occasionally and a cough is heard. The cough is at first repeated and harsh, but soon becomes softer and moist as the discharge increases. Again the cough varies according to the source of the discharge, for in light cases this may be only a catarrh of the nasal canals, or it may be from the throat, the windpipe, or the air-tubes of the lungs, or even from the lungs themselves. According to the organ affected the symptoms and character of cough will be similar to those of a laryngitis, bronchitis, or lung fever caused by ordinary cold.

Shortly after the discharge is seen a swelling takes place under the jaw, or in the intermaxillary space. This is at first puffy, swollen, somewhat hot and tender, and finally becomes distinctly so, and an abscess is felt, or having broken itself the discharge is seen dripping from a small opening. When the discharge from the nostrils has fully devel-

oped the fever usually disappears and the animal regains its appetite, unless the swelling is sufficient to interfere with the function of the throat, causing pain on any attempt to swallow. At the end of four or six days the discharge lessens, the soreness around the throat diminishes, the horse regains its appetite, and in two weeks has regained its usual condition.

Old and strong horses may have the disease in so light a form that the fever is not noticeable; they may continue to eat and perform their ordinary work as usual and no symptom may be seen beyond a slight discharge from the nose and a rare cough, which is not sufficient to worry any but the most particular owner. But, on the other hand, the disease may assume a malignant form or become complicated so as to become a most serious disease, and even prove fatal in many cases. Inflammation of the larynx and bronchi, if excessive, will produce violent, harsh coughing, which may almost asphyxiate the animal. The large amount of discharge may be mixed with air by the difficult breathing, and the nostrils, the front of the animal, manger and surrounding objects become covered with a white foam. The inflammation may be in the lung itself (lobular pneumonia) and cause the animal to breathe heavily, heave at the flanks, and show great distress. In this condition marked symptoms of fever are seen; the appetite is lost, the coat is dry, the horse stands back in his stall at the end of the halter strap with his neck extended and his legs propped apart to favor its breathing. This condition may end by resolution, leaving the horse for some time with a severe cough, or the animal may die from choking up of the lunge (asphyxia).

The swelling under the jaw may be excessive, and if the abscess is not opened it burrows toward the throat or to the side and causes inflammation of the parotid glands and breaks in annoying fistulas at the sides of the throat and even up as high as the ears. Roaring may occur either during a moderately severe attack from inflammation of the throat (larynx), or at a later period as the result of continued lung trouble. Abscesses may develop in other parts of the body, in the poll, in the withers, or in the spaces of loose tissue under the arms, in the fold of the thigh, and, in entire horses, in the testicles.

During the course of the disease or later, when the animal seems to be on the road to perfect recovery, abscesses may form in the

internal organs and produce symptoms characteristic of disease of those parts.

Delirium. Roaring, plunging, wandering in a circle, or standing with the head wedged in the corner of the stall, indicates the collection of matter in the brain. Sudden and severe lung symptoms, without previous discharge, point to an abscess between the lungs, in the mediastinum; colic, which is often continuous for days, is the result of the formation of an abscess in some part of the abdominal cavity, usually in the mesentery.

Pathology. The lesions of strangles are found on the surface of the mucous membranes, essentially of the respiratory system and in the loose connective tissue fibers of the internal organs and glands, and consist of acute inflammatory changes, tending to the formation of matter. The blood is unaltered, though it is rich in fibrine, and if the animal has died of asphyxia it is found dark colored and uncoagulated when the body is first opened. If the animal has died while suffering from high fever the ordinary alterations throughout the body, which are produced by any fever not attended by alteration of blood, are found.

Treatment. Ordinary light cases require but little treatment beyond diet, warm mashes, moistened hay, warm coverings, and protection from exposure to cold. The latter is urgently called for, as lung complications, severe bronchitis, and laryngitis are often the results of neglect of this precaution. If the fever is excessive the horse may receive small quantities of Glauber salts (handful three times a day), as a laxative, bicarbonate of soda or niter in dram doses every few hours, and small doses of antimony, iodide of potash, aconite, or quinine. Steaming the head with the vapor of warm water poured over a bucket of bran and hay, in which belladonna leaves and tar have been placed, will allay the inflammation of the mucous membranes and greatly ease the cough.

The swelling of the glands should be promptly treated by bathing with warm water and flaxseed poultices, and as soon as there is any evidence of the formation of matter it should be opened. Prompt action in this will often save serious complications. Blisters and irritating liniments should not be applied to the throat. When lung complications show themselves the horse should have mustard applied to the belly and to the sides of the chest. When convalescence begins great care must be taken not to expose the animal to cold,

which may bring on relapses, and while exercise is of great advantage it must not be turned into work until the animal has entirely regained its strength.

Anthrax. This is a severe and usually fatal contagious disease characterized by chills, great depression and stupor of the animal, and a profound alteration of the blood, due to destruction of the red blood corpuscles. It is caused by the admission into the animal body of bacteria, or low order of living organisms, or their spores, known as the "bacillus of Davaine" or "bacillus anthracis."

It affects all animals exposed to its contagion. The herbivora are especially susceptible in the following order: the sheep, the ox, and the horse. The Guinea pig, the hog, the rabbit, mice and other animals die quickly from its effects. Man, the dog, and other omnivora and carnivora may be attacked by it in a constitutional form as fatal as in the herbivora, but fortunately, in some cases, develop from it only local trouble, followed by recovery.

The direct cause of anthrax is always contagion or infection of a previously sound animal, either directly from a diseased animal or through various media which contain excretions or the debris from the body of a previously infected animal.

Outbreaks often occur at the time of the first rains after a dry season. During the latter the earthworm goes deep in the ground in search of moisture; it finds the spore which has been washed there in past years, swallows it, and brings it to the surface, when the rain furnishes the moisture which drives the worm itself from its deeper home. The virus is carried with the wool from infected sheep and remains in it through the process of manufacture into cloth. The spores remain in the hides of animals which have died of anthrax and retain their vitality throughout months of soaking in the tanners' pits, the working of the harness-maker or the cobbler and after the oiling of the completed leather. The dried spores in the dust from any of these products may be carried by the atmosphere.

Symptoms. The symptoms of anthrax develop with extreme rapidity; they are frequently so sudden that it appears but a few minutes for the animals to have passed from a condition of perfect health to a dangerously diseased one. The horse is dejected and falls into a state of profound stupor, attended by great muscular weakness. The feeble, indolent animal, if forced to move, drags its legs. There are severe chills, agitation of the muscles, symptoms of vertigo, and at times col-

icky pains. The mucous membranes turn a deep ochre or bluish-red color. The body temperature is rapidly elevated to 104° and 105° F. The breathing is increased to thirty or forty respirations in the minute and the pulse is greatly accelerated, but the arteries are soft and almost imperceptible, while the heart-beats can be felt and heard, violent and tumultuous. In other words, it resembles a very severe case of influenza, except in regard to the heart's action. The symptoms last but two, three, or four days, at most, when the case usually terminates fatally. An examination of the blood shows a dark fluid which is not clot, and which remains black after exposure to the air. After death the bodies putrify rapidly and bloat up; the tissues are filled with gases and a bloody foam exudes from the mouth, nostrils, and anus, and frequently the mucous membranes of the rectum protrude from the latter. The hairs detach from the skin. Congestion of all the organs and tissues is found, with interstitial hemorrhages. The muscles are friable and are covered with ecchymotic spots. This is specially marked in the heart.

The black, uncoagulated and incoaguable blood shows an iridescent scum on its surface, which is due to the fat of the animal dissolved by the ammonia, produced by the decomposed tissues. The serum oozes out of every tissue and contains broken-down blood, which, when examined microscopically, is found to have the red globules crenated and the leucocytes granular. A high power of the microscope also reveals the bacteria in the shape of little rod-like bodies of homogeneous texture with their brilliant spores.

The lymphatic ganglia are increased four, five, six, or ten times their natural size, enlarged by the engorgement of blood. The spleen shows nodulated black spots containing a muddy blood, which is found teeming with the virus. The mucous membranes of the intestines are congested and brown; the surface of the intestines is in many places denuded of its lining membrane, showing fissures and hemorrhagic spots. The liver has a cooked appearance; the kidneys are congested and friable; the urine is red; the pleura, lungs, and the meninges are congested and the bronchi of the lungs contain a bloody foam.

The symptoms are those which are found in any disease with a rapidly decomposing blood.

Treatment The treatment of anthrax was entirely useless and ineffectual until within a comparatively few years. The curative treatment, for which almost every drug in the pharmacopœia has been used,

was without avail, except, perhaps, the use of iodine, injected in the circulation in as large quantities as could be tolerated by the system. This treatment gives good results in the human being, but requires too much personal attention to be economical in animals when the disease occurs in epidemic form, although it may be used in the horse when occurring in an animal of great value.

The prophylactic treatment formerly consisted in the avoidance of certain fields and marshes which were recognized as contaminated during the months of August and September and had been occupied the years in which the outbreaks usually occurred. It underwent, however, a revolution after the discovery by Pasteur of the possibility of a prophylactic inoculation which granted immunity from future attacks of the disease equal to that granted by the recovery of an animal from an ordinary attack of the disease.

This treatment consists in an artificial cultivation of the virus of anthrax in broths, jellies, or other media, and in the treatment of it by means of continued exposure to the atmosphere or to a high temperature for a certain length of time, which weakens the virus to such an extent that it is only capable of producing an ephemeral fever in the animal in which it is inoculated, and which yet has retained a sufficient amount of its power to protect the animal from inoculation of a stronger virus. The production of this virus, which is carried on in some countries at the expense of the government and is furnished at a small cost to the farmers in regions where the disease prevails, in this country is made only in private laboratories.

Inflammation with Pustules. This is often wrongly named "farcy buds." In this affection the individual elevations on the inflamed skin show in the center a small sac of white, creamy pus, in place of the clear liquid of a blister. They vary in size from a millet seed to a hazel nut. The pustules of glanders (farcy buds) are to be distinguished by the watery contents and the cord-like swelling, extending from the pustules along the line of the veins, and those of boils by the inflammation and sloughing out of a core of the true skin. The hair on the pustule stands erect, and is often shed with the scab which results. When itching is severe the parts become excoriated by rubbing, and, as in the other forms of skin disease, the character of the eruption may become indistinct. Old horses suffer mainly at the root of the mane and tail, and about the

heels, and suckling foals around the mouth, on the face, inside the thighs, and under the tail.

Pustules like eczema are especially liable to result from unwholesome food and indigestion, from a sudden change of food, above all from dry to green food. In foals it may result from overheating of the mare and allowing the first milk after she returns, or by milk rendered unwholesome by faulty feeding of the dam. If a foal is brought up by hand the scouring and decompositions in the milk derange the digestion and cause such eruption. Vetches and other plants affected with honeydew and buckwheat have been the cause of these eruptions on white portions of the skin. Disorders of the kidneys or liver are common causes of this affection.

Treatment. Apply soothing ointments, such as benzoated oxide of zinc, or vaseline with one dram oxide of zinc in each ounce. Or a wash of one dram sugar of lead or two drams hyposulphite of soda in a quart of water may be freely applied. If the skin is already abraded and scabby, smear thickly with vaseline for some hours, then wash with soapsuds and apply the above dressings. When the excoriations are indolent they may be painted with a solution of lunar caustic, two grains to one ounce of distilled water. Internally counteract costiveness and remove intestinal irritants by the same means as in eczema, and follow this with one-half ounce doses daily of hyposulphite of soda, and one-half ounce doses of gentian. Inveterate cases may often be benefited by a course of sulphur, bisulphite of soda, or arsenic. In all the greatest care must be taken with regard to food, feeding, watering, cleanliness, and work. In wet and cold seasons predisposed animals should, as far as possible, be protected from wet, mud, snow, and melted snow, above all from that which has been melted by salt.

Fever. This is a general condition of the animal body in which there is an elevation of the animal body temperature, which may be only a degree or two or may be 10° F. The elevation of the body temperature, which represents tissue change or combustion, is accompanied by an acceleration of the heart's action, a quickening of the respiration, and an aberration in the functional activity of the various organs of the body. These organs may be stimulated to the performance of excessive work, or they may be incapacitated from carrying out their allotted tasks, or in the course of a fever the two conditions may both exist, the

one succeeding the other. To fever as a disease is usually added chills as an essential symptom.

Whether the cause of the fever has been an injury to the tissues, as a severe bruise, a broken bone, an inflamed lung, or excessive work which has surcharged the blood with the waste products of the combustion of the tissues, which were destroyed by produce force; or the pullulation of the ferments of influenza in the blood which destroy the red blood corpuscles; or the presence of irritating material, either in the form of living organisms or of their products, as in glanders or tuberculosis, the general train of symptoms are the same, only varying as the amount of the irritant differs in quantity, or when some special quality in them has the specific action on one or another tissue.

There is in fever at first a relaxation of the small blood vessels, which may have been preceded by a contraction of the same if there was a chill, and as a consequence there is an acceleration of the current of the blood. There is then an elevation of the peripheral temperature, followed by a lowering of tension in the arteries and an acceleration in the movement of the heart. These conditions may be produced by a primary irritation of the nerve centers, or the brain from the effects of heat, as is seen in thermic fever or sunstroke, in which trouble the extremes of symptoms may sometimes be seen alternating with a very short period, to be counted scarcely by hours.

There are times when it is difficult to distinguish between the existence of fever as a disease and a temporary feverish condition which is the result of excessive work. Like the condition of congestion of the lungs, which is normal up to a certain degree in the lungs of a race horse after a severe race, and morbid when it produces more than temporary phenomena or when it causes distinct lesions, fever, or as it is better termed a feverish condition, may follow any work or other employment of energy in which excessive tissue change has taken place, but if the consequences are ephemeral, and no recognizable lesion is apparent, it is not considered morbid. This condition, however, may predispose to severe organic disturbance and local inflammations which will cause disease, as an animal in this condition is liable to take cold, develop a lung fever or a severe enteritis, if chilled or otherwise exposed.

Fever in all animals is characterized by the same general phenomena,

but we find the intensity of the symptoms modified by the species of animals affected, by the races which subdivide the species, by the families which form groups of the races, and by certain conditions in individuals themselves. For example, a pricked foot in a thoroughbred may cause intense fever, while the same injury in the foot of a Clydesdale may scarcely cause a visible general symptom. In the horse, fever produces the following symptoms:

The normal body temperature is elevated from one to nine degrees. A temperature of 102° or 103° F. is moderate, 104° to 104° F. is high, and 105° F. and over is excessive.

This elevation of temperature can readily be felt by the hand placed in the mouth of the animal, or in the rectum, and in the folds between the hind legs; it is usually appreciable at any point over the surface of the body and in the expired air emitted from the nostrils. The ears and cannons are often as hot as the rest of the body, but are sometimes cold, which denotes a debility in the circulation. The pulse, which in a healthy horse is felt beating about forty-two to forty-eight times in the minute, is increased to sixty, seventy, ninety, or even one hundred. The respirations are increased from fourteen or sixteen to twenty-four, thirty, thirty-six, or even more. With the commencement of a fever the horse usually has its appetite diminished, or it may have total loss of appetite, if the fever is excessive. There is, however, a vast difference among horses in this regard. With the same amount of elevation of temperature one horse may lose its appetite entirely, while others, usually of the more common sort, will eat at hay throughout the course of the fever and will even continue to eat oats and other grains. Thirst is usually increased, but the animal desires only a small quantity of water at a time, and in most cases of fever a bucket of water with the chill taken off should be kept standing before the patient, who may be allowed it whenever the animal desires. The skin becomes dry and the hairs stand on end. Sweating is almost unknown in the early stage of fevers, but frequently occurs later in their course, when an outbreak of warm sweat is often a most favorable symptom. The mucous membranes, which are most easily examined in the conjunctiva of the eyes and inside of the mouth, change color if the fever is an acute one; without alteration of blood the mucous membranes become a rosy or deep red color at the outset; if the fever is attended with distinct alteration of the blood, as in influenza, and at the end of two or three days in severe cases of pneumonia or other extensive inflammatory troubles, the mucous mem-

branes are tinged with yellow, which may even become a deep ochre in color, the result of the decomposition of the blood corpuscles and the freeing of their coloring matter, which acts as a stain. At the outset of a fever the various glands are checked in their secretions, the salivary glands fail to secrete the saliva, and we find the surface of the tongue and inside of the cheeks dry and covered with a brownish, bad-smelling deposit. The excretion from the liver and intestinal glands is diminished and produces an inactivity of the digestive organs which causes a constipation. If this is not remedied at an early period the undigested material acts as an irritant, and later we may have it followed by an inflammatory process, producing a severe diarrhea.

The excretion from the kidneys is sometimes at first entirely suppressed. It is always considerably diminished, and what urine is passed is dark in color, undergoes ammoniacal change rapidly, and deposits quantities of salts. At a later time the diminished excretion may be replaced by an excessive excretion, which aids in carrying off waste products and usually indicates an amelioration of the fever.

While the ears, cannons, and hoofs of a horse suffering from fever are usually found hot, they may frequently alternate from hot to cold in their temperature, or be much cooler than they normally are. This latter condition usually indicates great weakness on the part of the circulatory system. It is of the greatest importance as an aid in diagnosing the gravity of an attack of fever and as an indication in the selection of its mode of treatment, to recognize the exact cause of a febrile condition in the horse. In certain cases, in very nervous animals in which fever is the result of nerve influence, a simple anodyne, or even only quiet with continued care and nursing, will sometimes be sufficient to diminish it.

When fever is the result of local injury the cure of the cause produces a cessation in the constitutional symptoms: when fever is the result of a pneumonia or other severe parenchymatous inflammation, it usually lasts for a definite time, and subsides with the first improvement of the local trouble, but in these cases we constantly have exacerbations of fever due to secondary inflammatory processes, such as the formation of small abscesses the development of secondary bronchitis, or the death of a limited amount of tissue (gangrene).

In specific cases, such as influenza, strangles, and septicæmia, there is a definite poison contained in the blood-vessel system, and carried to

the heart and to the nervous system, which produces a peculiar irritation, usually lasting for a specific period, during which the temperature can be but slightly diminished by any remedy.

In cases attended with complications, the diagnosis becomes at times still more difficult, as at the end of a case of influenza which becomes complicated with pneumonia. The high temperature of the simple inflammatory disease may be grafted on that part of the specific trouble, and the line of causation of the fever between the two, frequently a narrow one is yet an important one, as upon it depends the mode of treatment.

Any animal suffering from fever, from any cause, is much more susceptible to attacks of local inflammation, which become complications of the original disease, than are animals in sound health. In fever we have the tissues and the walls of the blood vessels weakened, we have an increased current of more or less altered blood, flowing through the vessels and stagnating in the capillaries, which need but an exciting cause to transform the passive congestion of fever into an active congestion and acute inflammation. These conditions become still more distinct when the fever is accompanied by a decided deterioration in the blood itself, as is seen in influenza, septicæmia, and at the termination of severe pneumonias.

Fever, with its symptoms of increased temperature, acceleration of the pulse, acceleration of respiration, dry skin, diminished secretions, etc., must be considered as a symptom of organic disturbance.

This organic disturbance may be the result of local inflammation or other irritants acting through the nerves on nerve centers; alterations of the blood, in which a poison is carried to the nerve centers, or direct irritants to the nerve centres themselves, as in cases of heat stroke, injury to the brain, etc.

Treatment. The treatment of fever depends upon its cause. As nerve irritation enters into the etiology of fever in all cases, one of the important factors in treatment is absolute quiet. This may be obtained by placing a sick horse in a box stall, away from all other animals and extraneous noises, and sheltered from excessive light and draughts of air. Anodynes, belladonna, hyposcyamus, and opium, act as antipyretics simply by quieting the nervous system. As an irritant exists in the blood in most cases of fever, any remedy which will favor the excretion of foreign elements from it will diminish this cause. We therefore employ diaphoretics to stimulate sweat and excretions from

the skin; diuretics to favor the elimination of matter by the kidneys; cholagogues and laxatives to increase the action of the liver and intestines, and to obtain from these important organs all the waste material which is aiding to choke up and congest their rich plexuses of blood vessels. As the heart becomes stimulated to increased action at the outset of a fever, and increases it by pumping an augmented quantity of blood through the whole body, we employ cardiac depressants to diminish the force of this organ. Among these, antimony, aconite, veratrum viride, and iodide of potash are the most important. The increased blood pressure throughout the body may also be diminished by lessening the quantity of blood. This is obtained in many cases with advantage by direct abstraction of blood, as in bleeding from the jugular or other veins, or by derivatives, such as mustard, turpentine, or blisters applied to the skin; or setons, which draw to the surface the fluid of the blood, thereby lessening its volume, without having the disadvantage found in bleeding, of impoverishing the elements of the blood.

When the irritation which is the cause of fever is a specific one, either in the form of bacteria (living organism), as in glanders, tuberculosis, influenza, septicæmia, etc., or in the form of a foreign chemical element, as in rheumatism, gout, hæmaglobinuria, and other so-called diseases of nutrition, we employ remedies which have been found to have a direct specific action on them. Among the specific remedies for various diseases are counted quinine, carbolic acid, salicyclic acid, antipyrine, mercury, iodine, the empyreumatic oils, tars, resins, aromatics, sulphur, and a host of other drugs, some of which are *AD HOC* and others of which are theoretical in action. Certain remedies, like simple aromatic teas, vegetable acids, as vinegar, lemon juice, etc., alkalines in the form of salts, sweet spirits of niter, etc., which are household remedies, are always useful, because they act on the excreting organs and ameliorate the effects of fever.

Pleuro-Pneumonia. See page 88.

Rabies or Hydrophobia. See page III.

GLANDERS OR FARCY.

A Contagious Constitutional Disease.

GLANDERS AND FARCY THE SAME DISEASE, CAN BE COMMUNICATED TO MAN, CHRONIC FARCY, CHRONIC GLANDERS, ACUTE FARCY GLANDERS.

GLANDERS is a contagious constitutional disease of the horse, ass, and mule and is readily communicable to man, sheep, goat, dog, cat, rabbit, and Guinea pig. It runs a variable course until it produces the death of the animal affected with it. It is characterized by the formation of neoplasms of connective tissue, or tubercles which degenerate into ulcers from which exudes a peculiar discharge. It is accompanied by a variable amount of fever according to the rapidity of its course. It is subject to various complications of the lymphatic glands, of the lungs, of the testicles, of the internal organs, and of the subcutaneous connective tissues.

Glanders was imported into America at the close of the last century, and before the end of the first half of the present century had spread to a considerable degree among the horses of the Middle and immediately adjoining Southern States. This disease was unknown in Mexico until carried there during the Mexican war by the badly diseased horses of the United States Army. During the first half of the present century a large school of veterinarians and medical men protested against the contagious character of this disease, and prevailed by their opinion to such an extent against the common opinion that several of the governments

of Europe undertook a series of experiments to determine the right between the existing parties.

At the veterinary school at Alfort, and at the farm of Lamirault in France, several hundred horses which had passed examination as sound had placed among them glandered horses under various conditions. The results of these experiments proved conclusively the contagious character of the disease.

Etiology. The contagious nature of glanders, in no matter what form it appears, being to-day definitely demonstrated, we can recognize but one cause for all cases, and that is contagion by means of the specific virus of the disease.

In studying the writings of the old authors on glanders, and the works of those authors who contested the contagious nature of the disease, we find a large number of predisposing causes assigned as factors in the development of the malady.

While a virus from a case of glanders if inoculated into an animal of the horse family will inevitably produce the disease, we find a vast difference, in the contagious activity of the products of different cases of glanders. We find a great variation in the manner and rapidity of the development of the disease in different individuals, and we find that the contagion is much more apt to be carried to sound animals under certain circumstances than it is under others. Only certain species of animals are susceptible of contracting the disease, and while some of these contract it as a general constitutional malady, in others it only develops as a local sore.

In acute glanders the contagion is found in its most virulent form, as is shown by the inevitable inaction of susceptible animals inoculated with the disease; while the discharge from chronic glanders and farcy may at times be inoculated with a negative result; again, in acute glanders, as we have a free discharge, a much greater quantity of virus-containing matter is scattered in the neighborhood of an infected horse to serve as a contagion to others than is found in the small amount of discharge of the chronic cases.

The chances of contagion are much greater when sound horses, asses, or mules are placed in the immediate neighborhood of glandered horses, drink from the same bucket, stand in the next stall, or are fed from the same bales of hay or straw which have been impregnated by the saliva and soiled by the discharge of sick animals. The contagion must terminate by direct contact of the discharges of a glandered animal with the

tissues of a sound one, either on the exterior or when swallowed mixed with food into the digestive tract.

Glanders is not infectious in the old acceptance of the word. Renault made a large number of experiments, forcing sound horses to breathe the expired air of glandered horses for an hour and a half a day for seven days, by means of a tube of canvass, and was unable to produce the disease in any case.

The stable attendants serve as one of the most common carriers of the virus. Dried or fresh discharges are collected from the infected animal in cleaning, harnessing, feeding, and by means of the hands, clothing, the teeth of the currycomb, the sponge, the bridle, and halter, are carried to other animals.

An animal affected with chronic glanders in a latent form is moved from one part of the stable to another, or works hitched with one horse and then with another, and may be an active agent in the provocation of disease without the cause being recognized.

Glanders is found frequently in the most hidden forms, and we recognize that it can exist without being apparent; that is, it may affect a horse for a long period without showing any symptoms that will allow even the most experienced veterinarian to make a diagnosis. An old gray mare belonging to a tavern keeper was reserved for family use with good care and light work for a period of eight years, during which time other horses in the tavern stable were from time to time affected with glanders without an apparent cause. The mare, whose only trouble was an apparent attack of heaves, was sold to a huckster, who placed her at hard work. Want of feed and overwork and exposure rapidly developed a case of acute glanders, from which the animal died.

In a recent case a coach horse was examined for soundness and passed as sound by a prominent veterinarian, who a few months afterwards treated the horse for a skin eruption from which it recovered. Twelve months afterward it became hidebound, with a slight cough and a slight eruption of the skin, which was attributed to clipping and the rubbing of the harness, but which had nothing suspicious in its character. The horse was placed on tonics and put to regular light driving. In six weeks it developed a bronchitis without having been specially exposed, and in two days this trouble was followed by a lobular pneumonia and the breaking of an abscess in the right lung. Farcy buds developed on the surface of the body and the animal died.

Public watering troughs and the feed boxes of boarding-stables and the tavern stables of market towns are among the most common recipients for the virus of glanders, which is most dangerous in its fresh state, but cases have been known to be caused by feeding animals in the box or stall in which glandered animals had stood more than a year before.

The horse, the ass, and the mule, are the animals which are the most susceptible to contract glanders, but in these we find a much greater receptivity in the ass and mule than we do in the horse. In the ass and mule in almost all cases the period of incubation is short and the disease develops in an acute form. We find that the race of horse infected influences the character of the disease; in full-blooded, fat horses, of a sanguinary temperament, the disease usually develops in an acute form, while in the lymphatic, cold-blooded, more common race of horses, the disease usually assumes a chronic form.

In the dog the inoculation of glanders may develop a constitutional disease with all the symptoms which are found in the horse, but more frequently the virus pullulates only at the point of inoculation, remaining for some time as a local sore, which may then heal, leaving a perfectly sound animal; but while the local sore is continuing to ulcerate, and specific virus exists in it, it may be the carrier of contagion to other animals. In man we find a greater receptivity to glanders than in the dog, and in many unfortunate cases the virus spreads from the point of inoculation to the entire system and destroys the wretched mortal by extensive ulcers of the face and hemorrhage, or by destruction of the lung tissue; in other cases, however, most fortunately, glanders may develop as in the dog, only in local form, not infecting the constitution and terminating in recovery, while the specific ulcer by proper treatment is turned into a simple one. In the cat species glanders is more destructive than in the dog. The point of inoculation ulcerates rapidly and the entire system becomes infected. A pack of wolves in the Philadelphia Zoological Garden died in ten days after being fed with the meat of a glandered horse. The rabbit, Guinea pig and mice are specially susceptible to the inoculation of glanders, and the recent discoveries in regard to this disease have made these animals most convenient witnesses and proofs of the existence of suspected cases of the glanders in other animals by the results of successful inoculations.

A litter of kittens lapped the blood from the lungs of a glandered horse on which an autopsy was being made, and in four days almost

their entire faces, including the nasal bones, were eaten away by rapid ulceration. Tubercles were found in the lungs.

The sheep and the goat are both capable of developing the disease. The goat is more susceptible and frequently develops it by means of the digestive tract, from its habit of eating droppings, rags, etc. which are found in the neighborhood of the stall.

Horned cattle and barnyard fowls are absolutely exempt from attacks of glanders, whether the virus is given to them by the digestive tract or inoculated into their tissues.

The previous reference to the existence of glanders under the two forms more commonly differentiated as glanders and as farcy, and our reference to the various conditions in which it may exist as acute, chronic and latent, show that the disease may assume several different phases. Without losing sight for a moment of the fact that all of these varied conditions are identical in their origin and in their essence, for convenience of study we may divide glanders into three classes: CHRONIC FARCY, CHRONIC GLANDERS, and ACUTE FARCY GLANDERS.

Chronic Farcy. In farcy the symptoms commence by formation of little nodes on the under surface of the skin, which rapidly infringe on the tissues of the skin itself. These nodes, which are known as farcy "buds" and farcy "buttons," are from the size of a bullet to the size of a walnut. They are hot, sensitive to the touch, at first elastic and afterwards become soft; the tissue is destroyed, and infringing on the substance of the skin the disease produces an ulcer, which is known as a chancre. The ulcer is irregular in shape, with ragged edges which overhang the sore; it has a gray, dirty bottom and the discharge is sometimes thin and sometimes purulent; in either case it is mixed with a viscous, sticky, yellowish material like the white of an egg in consistency, and like olive oil in appearance. The discharge is almost diagnostic; it resembles somewhat the discharge which we have in greasy heels and in certain attacks of lymphangitis, but to the expert the specific discharge is characteristic. The discharge accumulates on the hair surrounding the ulcer and over its surface and dries, forming scabs which become thicker by successive deposits on the undersurface until they fall off, to be replaced by others of the same kind; and the excess of discharge may drop on the hairs below and form similar brownish yellow crusts. The farcy ulcers may retain their specific form for a considerable time—days or even weeks; but eventually the discharge becomes purulent in character and assumes the appearance of healthy

matter. The surface of the gangrenous bottom of the ulcer is replaced by rosy granulations, the ragged edges beveled off, and the chancre is turned into a simple ulcer which rapidly heals.

The farcy buttons occur most frequently on the sides of the lips, the sides of the neck, the lower part of the shoulders, the inside of the thighs, or the outside of the legs, but may occur at any part of the body.

We have next an inflammation of the lymphatic vessels in the neighborhood of the chancres. These become swollen and then indurated and appear like great ridges underneath the skin; they are hot to the touch and sensitive. The cords may remain for a considerable time and then gradually disappear, or they may ulcerate like a farcy bud itself, forming elongated, irregular, serpentine ulcers with a characteristic, dirty, gray bottom and ragged edges, and pour out a viscous oily discharge like the chancres themselves.

The essential symptoms of farcy are the above; the button, the chancre, the cord, and the discharge. We have in addition to these symptoms a certain number of accessory symptoms, which, while not diagnostic in themselves, are of great service in aiding the diagnosis in cases where the eruption takes place in small quantities, and when the ulcers are not characteristic.

Epistaxis, or bleeding from the nose without previous work or other apparent cause, is one of the frequent concomitant symptoms in glanders; and such a hemorrhage from the nostrils should always be regarded with suspicion. The animal with farcy frequently develops a cough, resembling much that which we find in heaves—a short, dry, aborted, hacking cough, with little or no discharge from the nostrils. With this we find an irregular movement of the flanks, and on auscultation of the lungs we find sibilant or at times a few mucous rales. Another common symptom is a sudden swelling of one of the hind legs; it is suddenly found swollen in the region of the cannon, the enlargement extending below to the pastern and above as high as the stifle. This swelling is hot and painful to the touch, and renders the animal stiff and lame. On pressure with the finger the swelling can be indented, but the pits so formed soon fill up again on removal of the pressure. In severe cases we may have ulceration of the skin, and serum pours out from the surface, resembling the oozing which we have after a blister or in a case of grease. This swelling is not to be confounded with the stocking in lymphatic horses, or the œdema which we have in chronic

heart or in kidney trouble, as in the last the swelling is cool and not painful and the pitting on pressure remains for some time after the latter is withdrawn. It is not to be confounded with greasy heels. In these the disease commences in the neighborhood of the pastern and gradually extends up the leg, rarely passing beyond the neighborhood of the hock. The swollen leg in glanders almost invariably swells for the entire length in a single night, or within a very short period. When greasy heels are complicated by lymphangitis we have a condition very much resembling that of farcy. The swelled leg in farcy is frequently followed by an outbreak of farcy buttons and ulcers over its surface. In the entire horse the testicles are frequently swollen, hot and sensitive to the touch, but they have no tendency to suppuration. The acute inflammation is rapidly followed by the specific induration which correspond to the local lesions in other parts of the body.

Chronic farcy in the ass and mule is an excessively rare condition, but sometimes occurs.

Chronic Glanders. In chronic glanders we have the same train of inflammatory phenomena, varying in appearance from those of chronic farcy only by the difference of the tissues in which they are located. In chronic glanders we have first the tubercle, which is a small node from the size of a shot to that of a small pea, which forms in the mucous membranes of the respiratory tract. This may be just inside of the wings of the nostrils or on the septum which divides the one nasal cavity from the other and be easily detected, or they may be higher in the nasal cavities on the turbinated bones, or they may form in the larynx itself, or on the surface of the trachea or deep in the lungs.

The tubercles, which are first red and hard and consist of new connective tissue, soon soften and become yellow; the yellow spot breaks and we have a small ulcer the size of the preceding tubercle, which has a gray, dirty bottom and ragged edges and is known as a chancre. This ulcer pours from its surface a viscous, oily discharge similar to that which we have seen in the farcy ulcer. The irritation of the discharge may ulcerate the lining mucous membrane of the nose, causing serpentine gutters with bottoms resembling those of the chancres themselves. If the tubercles have formed in large numbers we may have them causing an acute inflammation of the Schneiderian membrane, with a catarrhal discharge which may mark the specific discharge, or that which

comes from the ulcers and resembles the discharge of strangles or simple inflammatory diseases.

The eruption of the ulcers and discharge soon cause an irritation of the neighboring lymphatics; and in the intermaxillary space, deep inside of the jaws, we find an enlargement of the glands, which for the first few days may seem soft and, œdematous, but which rapidly becomes confined to the glands, these being from the size of an almond to that of a small bunch of berries, exceedingly hard and nodulated. The enlargement of the glands is found high up on the inside of the jaws, firmly adherent to the base of the tongue. It is not to be confounded with the swelling, puffy, œdematous, and not to be separated from the skin and subcutaneous connective tissues, which we find in strangles, in laryngitis, and in other simple inflammatory troubles.

These glands bear a great resemblance to the hard, indurated glands which we find in connection with the collection of pus in the sinuses; but in the latter disease the glands have not the nodulated feel which they have in glanders. With the glands we find indurated cords, feeling like balls of tangled wire or twine, fastening the glands together. The essential symptoms of glanders are the tubercle, the chancre, the glands, and the discharge. With the development of the tubercles on the respiratory tract, according to their number and the amount of eruption which they cause, we may have a cough which resembles that of a coryza, a laryngitis, a bronchitis, or a broncho-pneumonia, according to the location of the lesions. In chronic glanders we have the same accessory symptoms which we have in chronic farcy, the hemorrhage of the nose, the swelling of the legs, the chronic cough, and in the entire horse the swelling of the testicles.

On healing, the chancres on the mucous membranes leave small, whitish, star-shaped scars, hard and indurated to the touch, and which remain for almost an indefinite time. The chancres heal and the other local symptoms disappear, with the exception of the enlargement of the glands, and we find these so diminished in size that they are scarcely perceptible on examination. During the subacute attacks, with a minimum quantity of local troubles, in chronic glanders and chronic farcy the animal rarely shows any amount of fever, but does have a general depraved appearance; it loses flesh and becomes hide bound; the skin becomes dry and the hairs stand on end. There is cachexia, however, which resembles greatly that of any chronic, organic trouble, but is not

diagnostic, although it has in it certain appearances and conditions which often render the animal suspicious to the eye of the expert veterinarian, while without the presence of local lesions he would be unable to state on what he has based his opinion.

Acute Glanders. In the acute form of glanders we have the symptoms which we have just studied in chronic farcy and in chronic glanders in a more acute and aggravated form. We have a rapid outbreak of tubercles in the respiratory tract which rapidly degenerate into chancres and pour out a considerable discharge from the nostrils. We have a cough of more or less severity according to the amount and site of the local eruption. We have over the surface of the body swellings which are rapidly followed by farcy buttons, which break into ulcers; we have the indurated cords and enlargement of the lymphatics.

Bleeding from the nose, sudden swelling of one of the hind-legs, and the swelling of the testicles are apt to precede an acute eruption of the glanders. As the symptoms become more marked the animal has difficulty of respiration, the flanks heave, the respiration becomes rapid, the pulse becomes quickened, and the temperature becomes elevated to 103° , 104° , or 105° F.

With the other symptoms of an acute fever the general appearance and station of the animal is that of one suffering from an acute pneumonia, but on examination, while we may find sibilant and mucous rales over the side of the chest, and may possibly hear tubular murmurs at the base of the neck over the trachea, we fail to find the tubular murmur or the large area of dullness on percussion over the sides of the chest which belongs to simple pneumonia.

Cases of chronic farcy and glanders, if not destroyed, may live in a depraved condition until the animal dies from general emaciation and anæmia, but in the majority of cases, from some sudden exposure to cold, it develops an acute pneumonia or other simple inflammatory trouble which starts up the latent disease and the animal has acute glanders.

In the ass, mule, and plethoric horses, acute glanders usually terminates by lobular pneumonia. In other cases the general symptoms may subside. The symptoms of pneumonia gradually disappear, the temperature lowers, the pulse becomes slower, the ulcers heal, leaving small indurated cicatrices, and the animal may return to apparent health, or may at least be able to do a small amount of work with but a few symptoms of the disease remaining in a chronic form. During the attack of

acute glanders the inflammation of the nasal cavities frequently spreads into the sinuses or air cells, which are found in the forehead and in front of the eyes on either side of the face, and cause abscesses of these cavities, which may remain as the only visible symptom of the disease. An animal which has recovered from a case of acute glanders, like the animals which are affected by chronic glanders and chronic farcy, are apt to be affected with emphysema of the lungs or the heaves, and to have a chronic cough. In this condition they may continue for a long period, serving as dangerous sources of contagion, the more so because the slight amount of discharge does not serve as a warning to the owner or driver as profuse discharge does in the more acute cases.

With good care, good food, and good surroundings and little work, an animal affected with glanders may live for months or even years in an apparent state of perfect health, but with the first deprivation of food, with a few days of severe hard work, with exposure to cold or with the attack of a simple fever or inflammatory trouble from other causes, the latent seeds of the disease break out and develop the trouble again in an acute form.

Treatment. Fully the entire list of drugs in the pharmacopœia has been tested in the treatment of glanders. Good hygienic surroundings, good food, with alteratives and tonics, frequently ameliorate the symptoms and often do so to such an extent that the animal would pass the examination of any expert as a perfectly sound animal. But while in this case the number of tubercles of the lungs, which are invariable there, may be so few as not to cause sufficient disturbance in the respiration as to attract the attention of the examiner, they exist, and will remain there almost indefinitely with the constant possibility of a return of acute symptoms.

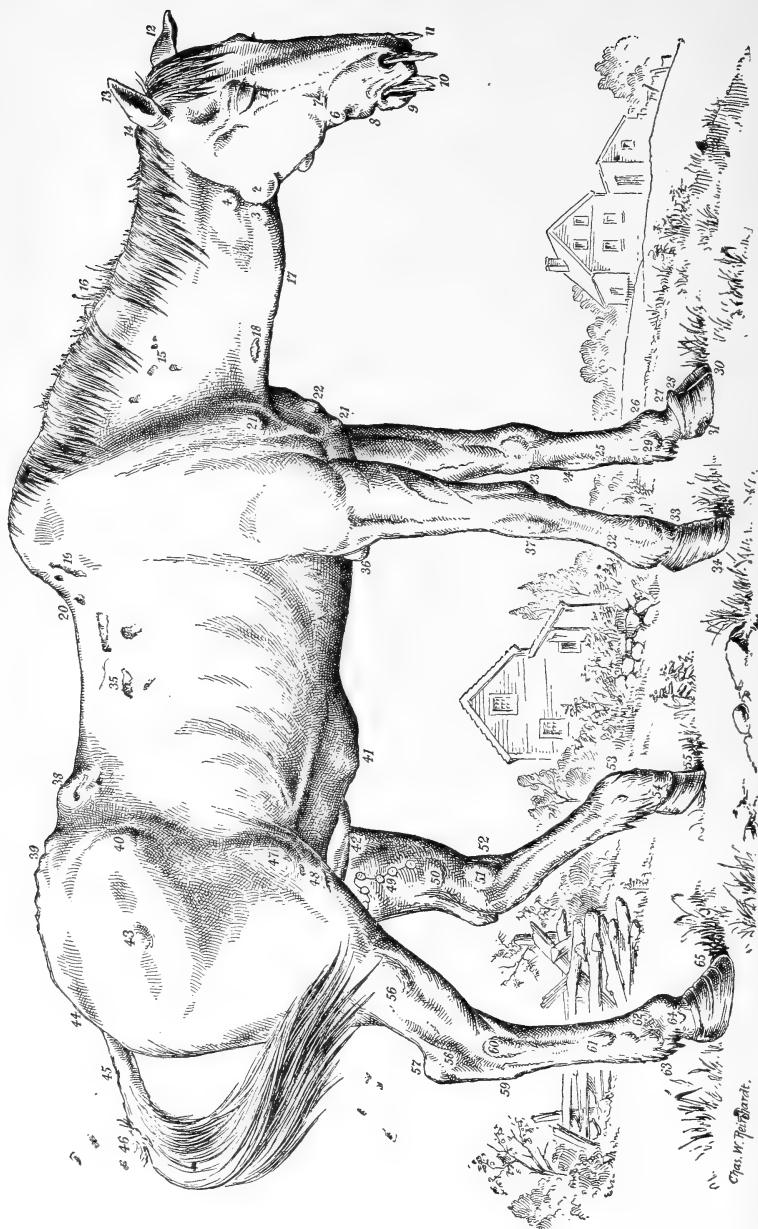
In several celebrated cases horses which have been affected with glanders have been known to work for years and die from other causes without ever having had the return of symptoms; but, allowing that these cases may occur, they are so few and far between, and the danger of infection of glanders to other horses and to the stable attendants is so great, that no animal which has once been affected with the disease should be allowed to live.

In all civilized countries, with the exception of some of the states in the United States, the laws are most stringent regarding the prompt declaration on the part of the owner and attending veterinarian at the

first suspicion of a case of glanders, and they allow a liberal indemnity for the animal. When this is done, in all cases the animal is destroyed and the articles with which it has been in contact are thoroughly disinfected. When the attendants have attempted to hide the presence of the disease in a community, punishment is meted to the owner, attending veterinarian, or other responsible parties.

Several states have passed excellent laws in regard to glanders, but with few exceptions these laws are not carried out with the rigidity with which they should be. In other states where an indemnity is allowed on declaration on the part of the owner, the appraisement of the animal is not fairly made. If the owners of infected animals are to be encouraged to declare the presence of the disease in order to protect their neighbors from the danger of contagion they should be paid, not what the animal affected with the disease is considered worth, when it is valueless, but the one-half or two-thirds of what would be its market value without the disease, and the community should share the loss which the owner should make in order to protect others.





EXTERNAL EVIDENCES OF DISEASE.

C. W. F. B. 1861.

CHAPTER XII.

EXTERNAL EVIDENCES OF MANY DISEASES.

Location and Name of Various Diseases.

THE COMMON NAMES GIVEN TO DEFORMITIES, THEIR CAUSES PRODUCING MANY FAMILIAR DISEASES, LACK OF CONFORMATION.

- 1.—BLIND EYE. There is often a continuous flow of tears over the cheek accompanying a blind eye.
- 2.—GOITRE. An enlarged thyroid gland.
- 3.—ENLARGED JUGULAR VEIN. This is often the result of bleeding, when improperly done.
- 4.—SWOLLEN PAROTID GLAND. Caused by undue pressure from throat-latch.
- 5.—BONE TUMOR. Caused by a blow on the jaw bone, by striking against the pole of a wagon or manger.
- 6.—SALIVARY FISTULA. A fistula of the duct that leads from the parotid gland to the mouth.
- 7.—FISTULA OF THE UPPER JAW. Caused by an ulcerated tooth.
- 8.—FISTULA OF THE LOWER JAW. Caused by an ulcerated tooth.
- 9.—FLABBY LIP. Caused by partial paralysis.
- 10.—EXCESSIVE SALIVA. Caused by a wound or swelling of the tongue.
- 11.—MUCUS. A discharge from the nose. It may be caused by acute or chronic catarrh, or in glanders.

- 12.—LOP EAR. Some horses have ears so large that they drop from their own weight.
- 13.—HARE EAR.
- 14.—POLL EVIL. A common name for a running sore on the back of the neck, often caused by the horse striking the part against a low-ceiling. It is also the result of a boil which has not properly healed.
- 15.—FARCY BUDS. Enlarged lymphatic glands. They are found on various parts of the body. See numbers 20 and 49.
- 16.—MANGE OR ITCH. These are skin diseases which often causes the animal to rub against the manger or fences till the hair and mane are all rubbed off.
- 17.—DEFORMED NECK. Sometimes called Ewe neck. The neck curves downward instead of upward.
- 18.—FISTULA. Caused by the wound from improper bleeding, failing to heal.
- 19.—FISTULOUS WITHERS. An abscess caused by a bruise from which there is a chronic discharge.
- 20.—SWAY BACK. A back that is very hollow.
- 21.—FARCY BUDS. Swelling of the lymphatic system.
- 22.—ABSCESS. Generally caused by bruise.
- 23.—ENLARGEMENT OF THE KNEE. The result of sprains or bruises.
- 24.—ENLARGED TENDONS. Caused by sprains. The tendons and their sheaths thicken at the back of the legs and cause lameness.
- 25.—SPLINT. Caused by an unnatural fluid being thrown off, between the common and splint bones, which gradually turns to bone.
- 26.—POINTED HIP. It is this kind which is so liable to be "knocked down."
- 27.—DEFORMED PASTER. A long low pastern throws the fetlock too low, and makes the animal subject to sprains.
- 28.—RIDGE IN THE HOOF. This is the result of fever in the coronet. A ridge or wrinkle in the hoof shows that the coronet at some previous time was injured or was effected with fever, and the hoof in growing out shows the result the same as the nail on a man's finger shows the result of an injury to the root of the nail.
- 29.—GALL. Caused by interfering.
- 30.—OX FOOT. A bulging out of the hoof in the front part of the foot, the result of disease of the coffin joint. Some horses are born with this peculiar form of the hoof, which is called "ox foot" from its resemblance to the hoof of the ox.

- 31.—**QUARTER-CRACK.** Caused by the nutrition of the hoof not being normal. The fibres of the hoof become brittle and the hoof splits.
- 32.—**MUD FEVER.** This is an inflammation in the skin, caused by driving the animal through mud and cold water. The leg swells, and the skin soon becomes scabby. It is not an uncommon thing for the hair to fall out.
- 33.—**STILT FOOT.** Result of diseases around the heels or quarters.
- 34.—**CONTRACTED HOOF.** Caused by disease or standing in the stable on a hard floor.
- 35.—**SADDLE GALL.** Caused by uneven pressure of the saddle.
- 36.—**SHOE BOIL.** A tumor caused by the horse lying on the shoe.
- 37.—**MALLENDERS.** An inflammation of the skin behind the knee, where the skin folds in doubling up the leg. The inflammation causes the skin to become dry and hard, and the knee becomes enlarged.
- 38.—**SITFAST.** At first a simple saddle gall, but if not properly attended to, becomes chronic, when it is called sitfast.
- 39.—**SNAKE BACK.** A rough, uneven back over the croup. It is sometimes called "eel-back."
- 40.—**POINTED HIP.** It is this kind of a hip that is so liable to be knocked down.
- 41.—**NAVEL RUPTURE.** The intestines extend downward through the navel opening, which is unclosed.
- 42.—**INGUINAL RUPTURE.** The intestines extend downward through the abdominal rings and inguinal canal. In stallions they extend downward into the scrotum.
- 43.—**ATROPHY OF THE MUSCLES.** This is caused by disease or a bruise, or from long standing lameness, causing a wasting away of the muscles from disease.
- 44.—**DROOPING RUMP.** A deformity.
- 45.—**RAT TAIL.** The hair having dropped off, from disease of the tail.
- 46.—**MANGE, OR ITCH.** These are skin diseases which often cause the animal to rub against the manger or the fences till the hair is rubbed off from different parts of the body.
- 47.—**FLANK HERNIA.** The intestines extending outward through the abdominal wall at the flank.
- 48.—**STIFLE.** A sprain, kick, or puncture at this point may cause stifle lameness. If the patella is out of position (dislocated) the horse is said to be stifled.

- 49.—FARCY BUDS. Enlarged lymphatic glands.
- 50.—BIG SPAVIN. A distension of the synovial sac, causing lameness.
- 51.—BONE SPAVIN. A bony tumor of the hock joint.
- 52.—SALLENDERS. An inflammation of the skin, behind the hock joint, where the skin folds in the bending of the foot backwards. The inflammation causes the skin to become hard and dry, and causes lameness.
- 53.—FRONT BURSAL SWELLING. A soft puffy swelling in front of the fetlock, caused by inflammation of the bursal.
- 54.—SAND-CRACK. Same as a quarter-crack, only this comes in front.
- 55.—HOOF WITH RIDGES. This indicates former inflammation of the coronet, as explained under No. 28.
- 56.—WEAK THIGH. Small from faulty formation.
- 57.—CAPPED HOCK. An enlargement on the point of the hock. It is often caused by a bruise from a kick in the stall or pasture.
- 58.—THOROUGHPIN. A puffy enlargement at the upper and back part of the hock joint, often appearing on both the inside and outside.
- 59.—CURB. An enlargement of the back of the hock, usually the result of a sprain.
- 60.—BLOOD SPAVIN. An enlargement of the vein at the hock, caused by a bony tumor pressing upon it.
- 61.—WIND GALLS. Soft swellings filled with secretion of the joints, called synovial fluid.
- 62.—ENLARGED LEG. Caused by neglect or the disease known as elephantiasis.
- 63.—GREASE HEEL. A skin disease that gives off an offensive discharge.
- 64.—QUITTOR. A fistula of the quarter, the opening above the coronet.
- 65.—FLAT-FOOT. The hoof is too flat and large.



MANIKIN OF THE
KNEE, FETLOCK, AND
ANKLE OF THE HORSE

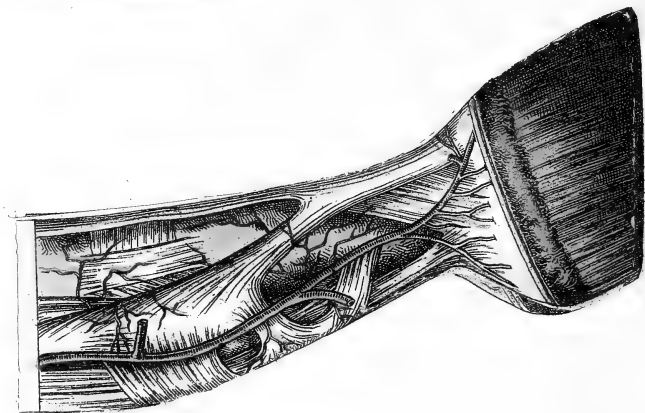
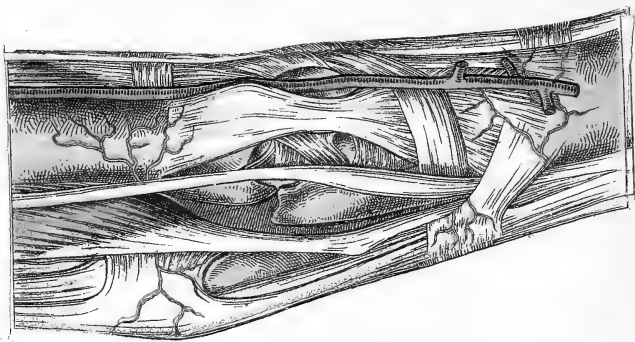
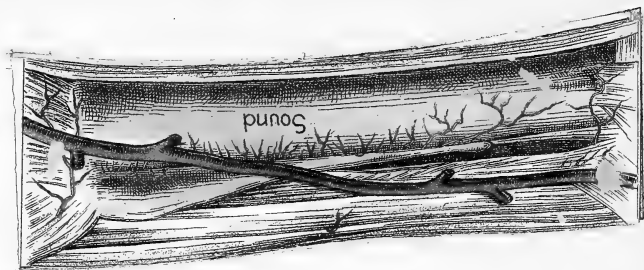
PREPARED EXPRESSLY FOR

HAND-BOOK OF READY REFERENCE

BY

A. GARDENIER

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CHAPTER XIII.

KNEE, FETLOCK, ANKLE, AND FOOT.

Their Diseases and How to Cure Them.

ANATOMICAL DESCRIPTION OF THE PARTS, PHYSIOLOGICAL FUNCTIONS, FAULTS OF FORMATION, INTERFERING, COCKED ANKLES, WIND GALLS, QUITTOR, CORNS, SAND-CRACKS, RINGBONE, SPLINT, SPAVIN, ETC., ETC.

NO FOOT, NO HORSE, is as true to-day as when the old aphorism first fell from the lips of man. Domestication of the ancient "companion of the wind," has caused him to be put to many uses, and the constant reproduction of hereditary defects has changed him into a very short-lived piece of machinery, which is often out of repair.

The horse, as a domestic animal, is of all the animal tribe the largest sharer with his master in his liability to the accidents and dangers which are among the incidents of civilized life. While travelling he may pick up a nail from the road, or slip upon an icy street. No matter where this faithful animal is, there is no hour when he is not in danger of incurring injuries which may demand the best skill to repair.

To detect and cure diseases of the organs of locomotion as well as the diseases of the other parts of the body, it is necessary to have a knowledge of the construction and functions of the parts which may be under consideration. Therefore, as a guide to a better understanding of the fetlock, ankle, and foot, we give the anatomical structures and physiological functions of their various parts.

For a thorough understanding of the parts described consult the **MANIKIN OF THE HORSE** on pages 17 to 22, and the **MANIKIN OF THE FETLOCK, ANKLE, AND FOOT**, just preceding this chapter.

Bones. The bones of the fetlock and foot constitute the skeleton on which the other structures are built, and comprise the lower end of the cannon bone (the metacarpus in the fore-leg and the metatarsus in the hind-leg), the two sesamoid bones, the large pastern or suffraginis, the small pastern or coronet, the coffin bone or os pedis, and the small sesamoid or navicular bone.

Cannon Bone. This bone extends from the knee or hock to the fetlock, and is cylindrical in shape, and stands nearly or quite perpendicular. In the fore-leg it is called the metacarpus and in the hind-leg the metatarsus. They correspond with the bones in the palm of the hand and the ball of the foot in man.

Sesamoid Bones. These occur in pairs, are small, shape resembling a three-faced pyramid, and are set behind the fetlock joint, at the upper end of the large pastern or suffraginis, having the base of the pyramid downward.

Suffraginis, or Large Pastern. This is a very compact bone, set in slanting direction downward and forward, and extends from the cannon bone to the coronet or small pastern.

Coronet, or Small Pastern. This is a short, cube-shaped bone, set between the suffraginis and coffin bone, in the same slanting direction.

Coffin Bone. This forms the end of the foot and is shaped like the horny box in which it is enclosed.

Navicular Bone. This is short, flattened above and below, and is attached to the coffin bone behind.

All of these bones are covered on the surfaces with a cartilage which goes to make up the joints, while the portions between are covered with a fibrous membrane called the periosteum.

Joints. The joints of the legs are of especial importance, since any interference with their function very largely impairs the value of the animal for most purposes. As the joints of the foot and ankle are at the point of greatest concussion they are the ones most subject to injury and disease.

There are three of these joints—the fetlock, pastern, and coffin. They are made by the union of two or more bones, held together

by ligaments of fibrous tissue, and are lubricated by a thick viscid fluid, called synovia, which is secreted by a special membrane inclosing the joints.

Fetlock. This joint is made by the union of the lower end of the cannon and the upper end of the large pastern bones, supplemented by the two sesamoids, so placed behind the upper end of the pastern that the joint is capable of a very extensive motion. These bones are held together by ligaments, only one of which (the suspensory) demands special mention.

Suspensory Ligament. This ligament starts from the knee, extends down behind the cannon, lying between the two splint bones, until near the fetlock, where it divides and sends a branch on either side of the joint, downward and forward, to become attached on the sides of the extensor tendon at the lower end of the pastern bone. As it crosses the sesamoids on the posterior borders of the fetlock it throws out fibers, which hold it fast to these bones.

Pastern Joint. This is made by the union of the two pastern bones.

Coffin Joint. This is made by the union of the small pastern, coffin, and small sesamoid or navicular bones, the latter being set behind and beneath the joint surface of the coffin bone, in such a way as to largely receive the weight of the large pastern.

Tendons. There are three tendons which serve to move the bones of the foot one on another. Two of these bend the joints, while the other extends or straightens the column bones.

Flexor Pedis Perforans. This is the deep flexor of the foot, passes down behind the cannon bone, lying against the suspensory ligament in front, crosses the fetlock joint in the groove made by the union of the two sesamoids, and is attached to the bottom of the coffin bone, after covering the navicular, by a wide expansion of its fibers. It is the function of this tendon to flex the coffin bone and with it the horny box.

Flexor Pedis Perforatus. This is the superficial flexor of the foot and follows the course of the preceding tendon, and is attached to the middle of the ankle. The function of this tendon is to bend the foot at the fetlock.

Extensor Pedis. This runs down the front of the leg and is attached on the most prominent point of the coffin bone, and has for its function the straightening of the bones of the ankle and foot.

The bones, ligaments, and tendons are covered by a loose connective tissue, which gives a symmetry to the parts by filling up and rounding off, and all are protected by the skin and hoof.

Skin of the Fetlock and Ankle.. This is generally characterized by its thickness and the length of its hairs, especially around the hind parts of the fetlock joint in certain breeds of horses. The most important part of this envelope is that known as the coronary band.

Coronary Band. This consists of that portion of the skin which secretes the horn by which the wall of the hoof is made. This horn much resembles the nail which grows on the fingers and toes of man. It is composed of hollow, cylindrical tubes, extending from the coronary band to the lower border of the hoof, which are held together by a tenacious opaque matter.

Hoof. This is a box of horn, consisting of a wall, sole, and frog, and contains, besides the coffin, navicular, and part of the small pastern bones, the sensitive laminae, plantar cushion, and the lateral cartilages.

The sole of the foot incloses the box on the ground surface, is shaped like the circumference of the foot, except that a **v** shaped opening is left behind for the reception of the frog, and is concave on the lower surface. The sole is produced by the velvety tissue, a thin membrane covering the plantar cushion and other soft tissues beneath the coffin bone. The horn of the sole differs from the horn of the wall, in that its tubes are not straight, and from the fact that it scales off in pieces over the whole surface.

Frog. This is a triangular shaped body, divided into two equal parts by a deep fissure, extending from its apex in front to the base. It fills the triangular space in the sole to which it is intimately attached by its borders. The horn of the frog is produced in the same manner as the sole, but it differs from both the wall and sole, in that the horn is soft, moist, and elastic to a remarkable degree. It is the function of the frog to destroy shock and prevent slipping.

Sensitive Laminae. These are thin plates of soft tissue covering the entire anterior surface of the coffin bone. They are present in great numbers, and by fitting into corresponding grooves on the inner surface of the horn of the wall the union of the soft and horny tissues is made complete.

Plantar Cushion. This is a thick pad of fibrous tissue, placed behind and under the navicular and coffin bones, and resting on the sole

and frog, for the purpose of receiving the downward pressure of the column of bones and to destroy shock.

Lateral Cartilages. These are attached, one on either side, to the wings of the coffin bone by their inferior borders. They are thin plates of fibro-cartilage, and their function is to assist the frog and adjacent structures to regain their proper position after having been displaced by the weight of the body while the foot rested on the ground.

Joints. The contact of two or more bones so arranged, that they move one upon the other either more or less is called a joint. In the movable joints at the point of articulation are ligaments whose office is the holding of the bones in position. There is as a result of the moving of one part upon the other a certain amount of friction, and to insure easy play and smooth movement of its parts nature has arranged a yellow, oily, or glairy lubricant, called synovia, the last somewhat resembling the white of an egg.

This fluid is deposited in a containing sac, and the serous membrane which forms the lining is the secreting organ. This membrane is of a very sensitive nature, and while it lines the inner face of the ligaments it is attached only upon the edges of the bones without extending upon their length or between the layers of cartilage, which lie between the bones and their articular surfaces.

So long as the bones, the muscles and their tendons, the joints with their cartilages, their ligaments and their synovial structure; the nerves and the blood vessels which distribute to every part, however minute, are exempt from disease, and pathological change, the function of motion will continue to be performed with perfection and efficiency.

But on the other hand, let any element of disease become implanted in one or several of the parts destined for combined action, any change or irregularity of form, location or action occur in any portion of the apparatus, any obstruction of vital power take place, any interference with the order of normal nature, any loss of harmony and lack of balance, and the result is LAMENESS.

Description of the Manikin. The outside plate on the right of page 168, shows the part of the leg between the knee and the fetlock joint in a healthy condition. The second plate of this series shows a DIFFUSE SPLINT, bony growth with a diffuse base, in which, the bone has permanently assumed greater size. This is a serious difficulty on account of the deformity interfering with the movement of the cord which passes behind it, thereby becoming a source of continual irritation and consequently permanent lameness.

The next plate of this series shows the simple splint, in which there is only a single bony growth. The horse by being called to perform tasks beyond his strength has strained his muscles and torn apart the fibres which unite the bones at their juncture.

The last plate of this series shows the simple splint on the bone with the muscles, cords, and tendons removed. Here can be plainly seen the smaller cannon bone which during the youth of the animal is more or less articulated, but which as the horse matures, becomes firmly joined by a rigid union and the turning into bone of their inter-articulate surfaces. By straining, this union becomes divided and as a consequence local irritation develops.

The outside plate of the series in the center, shows the hock with the skin removed. The bones which are surrounded by ligaments, tendons, and muscles correspond to the bones of the human ankle. The bone at the upper part is the tibia, the one at the lower the cannon bone, (metatarsus) while between them hidden by the ligaments and muscles are the os calcis, astragalus, cuboides, navicular, and the outer and the inner cuneiform bones.

The second plate of the center series shows a blood-spavin and a bone-spavin. The blood-spavin being the one indicated near the tibia (the highest on the plate) and is always found in front and a little inward of the hock. This is always round, smooth and well marked, and on the outer surface running from below upwards, will be found a vein which is more or less enlarged. It is from this conspicuous blood-vessel that the tumor is named. It is the dilatation of the articulate synorial sac and differs from thoroughpin in location and part affected. See thoroughpin.

The last plate of the series, shows a badly spavined hock. The bone has enlarged and become a fixed condition which there is no known method of removing.

The exterior plate at the left shows a sound foot and fetlock. The wall of the hoof is shown below and the periople (coronary band) just above. The ligaments of the joints are shown above and below, and the extensor tendon in front and the flexor tendon on the back of the fetlock is shown beginning near the top and extending downward to the hoof.

The second plate at the left shows a low ring-bone and a high ring-bone. The low ring-bone is found on the lower portion around the upper border of the foot. The high ringbone forms a large bunch on the upper part of the coronet quite close to the fetlock joint,

Faults of Formation. A large percentage of the horses have feet which are not perfect in formation, and as a consequence of these imperfections they are especially predisposed to certain injuries and diseases.

Flat Feet. This is that condition in which the sole has little or no convexity. It is a peculiarity common to some breeds, especially heavy, lymphatic animals raised on low, marshy soils. It is confined to the fore-feet, which are generally broad, low-heeled, and with a wall less upright than is seen in the perfect foot.

In flat-foot there can be little or no elasticity in the sole, for the reason that it has no arch and the weight of the animal is received on the entire plantar surface as it rests on the ground instead of on the wall. For these reasons such feet are particularly liable to bruises of the sole, corns, pumiced sole, and excessive suppuration when the process is once established. Horses with flat foot should be shod with a shoe having a wide web, pressing on the walls only, while the heels and frog are never to be pared. Flat-foot generally has weak walls, and as a consequence the nails of the shoe are readily loosened and the shoe cast.

Clubfoot. This is applied to such feet as have the walls set nearly perpendicular. When this condition is present the walls are high, the fetlock joint is thrown forward, or knuckles, and the weight of the animal is received on the toes. Many mules are clubfooted, especially behind, where it seems to cause little or no inconvenience. Clubfoot may be cured by cutting the tendons in severe cases, but as a rule special shoeing is the only measure of relief that can be adopted. The toe should not be pared, but the heels are to be lowered as much as possible and a shoe put on with a long projecting toe piece, slightly turned up, while the heels of the shoe are to be made thin.

Crooked Foot. This is that condition in which one side of the wall is higher than the other. If the inside wall is the higher, the ankle is thrown outward, so that the fetlock joints are abnormally wide apart and the toes close together. Animals with this deformity are "pigeon-toed," and are liable to interfere, the inside toe striking the opposite fetlock. If but one foot is affected, the other being perfect, the liability to interfere is still greater, for the reason that the fetlock of the perfect leg is more near the center plane.

When the outside heel is the higher the ankle is thrown in and the toe turns out. Horses with such feet interfere with the heel. If but

one foot is so affected, the liability to interfere is less than where both feet are affected, for the reason that the ankle of the perfect leg is not so near to the center line. Such animals are especially liable to stumbling and to lameness from injury to the ligaments of the fetlock joints. The deformity is to be overcome by such shoeing as will equalize length of walls, and by proper boots to protect the fetlocks from interfering.

Interfering. An animal is said to interfere when one foot strikes the opposite leg, as it passes by. The inner surface of the fetlock joint is the part most subject to this injury, although it may happen to any part of the ankle. It is more common in the hind than in the fore legs. Interfering causes a bruise, which is generally accompanied by broken skin. It may cause lameness, dangerous tripping, and thickening of the injured parts.

Causes. Faulty formation is the usual cause of interfering. When the bones of the leg are so united that the toe of the foot turns in (pigeon-toed), or when the fetlock joints are close together and the toe turns out, when the leg is so deformed that the whole foot and ankle turn either in or out, interfering is almost sure to follow. It may happen, also, when the feet grow too long; from defective shoeing; rough or slippery roads; from the exhaustion of labor or sickness; swelling of the leg; high knee action; fast work, and because the chest or hips are too narrow.

Symptoms. Generally, the evidences of interfering are easily detected, for the parts are tender, swollen, and the skin broken. But very often, especially in trotters, the flat surface of the hoof strikes the fetlock without evident injury, and attention is directed to these parts only by the occasional tripping and unsteady gait. In such cases proof of the cause may be had by walking and trotting the animal, after first painting the inside toe and quarter of the suspected foot with a thin coating of chalk, charcoal, mud, or paint.

Treatment. When the trouble is due to deformity or faulty formation it may not be possible to overcome the defect.

In such cases, and as well those due to exhaustion or fatigue, the fetlock or ankle boot must be used. In many instances interfering may be prevented by proper shoeing. The outside heel and quarter of the foot on the injured leg should be lowered sufficiently to change the relative position of the fetlock joint, by bringing it further away from the center

plane of the body, thereby permitting the other foot to pass by without striking.

A very slight change is often sufficient to effect this result. At the same time the offending foot should be so shod, that the shoe sets well under the hoof at the point which causes the injury. The shoe should be reset every three or four weeks.

When the cause has been removed cold water bandages to the injured parts will soon remove the soreness and swelling, especially in recent cases. If, however, the fetlock has become calloused from long-continued bruising, a Spanish fly blister over the parts, repeated in two or three weeks' time if necessary, will aid in reducing the leg to its natural condition.

Knuckling or Cocked Ankles. Knuckling is a partial dislocation of the fetlock joint, in which the relative position of the pastern bone to the cannon and coronet bones is changed, the pastern becoming more nearly perpendicular, with the lower end of the cannon bone resting behind the center line of the suffraginis, while the lower end of this bone rests behind the center line of the coronet. While knuckling is not always an unsoundness, it nevertheless predisposes to stumbling and to fracture of the pastern.

Causes. Young foals are quite subject to this condition, but in the great majority of cases it is only temporary. It is largely due to the fact that, before birth, the legs were bent; and time is required, after birth, for the ligaments, tendons, and muscles to adapt themselves to the function of sustaining the weight of the body.

Horses with erect pasterns are very prone to knuckle as they grow old, especially in the hind legs. All kinds of heavy work, particularly in hilly districts, and fast work on hard race-tracks or roads are exciting causes of knuckling. It is also seen as an accompaniment to that faulty formation called club-foot, in which the toe of the wall is perpendicular and short, and the heels high, a condition most often seen in the mule, especially the hind feet.

Lastly, knuckling is caused by disease of the suspensory ligament, or of the flexor tendons, whereby they are shortened, and by disease of the fetlock joints.

Treatment. In young foals no treatment is necessary, unless there is some deformity present, since the legs straighten up without interference in the course of a few weeks' time. When knuckling has commenced, relieve the tendons and ligaments by proper shoeing. Prepare

the foot for the shoe by shortening the toe as much as possible, leaving the heels high; or if the foot is prepared in the usual way the shoe should be thin in front, with thick heels and high calks. For the hind feet a long-heeled shoe with calks seems to do best. When possible, the causes of knuckling are to be removed, but since this can not always be done, the time may come when the patient can no longer perform any service, particularly in those cases where both fore-legs are affected, and it becomes necessary either to destroy the animal or secure relief by surgical interference. In such cases the operation is beyond the skill of the ordinary horseman, and an expert should be consulted.

Over-reaching. An over-reach is where the shoe of the hind foot strikes and injures the heel or quarter of the fore foot. It rarely happens except when the animal is going fast, hence is most common in trotting and running horses. In trotters the accident generally happens when the animal breaks from a trot to a run. The outside heels and quarters are most liable to the injury.

Symptoms. The coronet at the heel or quarter is bruised or cut, the injury in some instances involving the horn as well. Where the hind foot strikes well back on the heel of the fore-foot (an accident known among horsemen as "grabbing") the shoe may be torn from the fore-foot or the animal may fall to his knees. Horses accustomed to over-reaching are often "bad breakers," for the reason that the pain of the injury so excites them that they can not readily be brought back to the trotting gait.

Treatment. If the injury is but a slight bruise cold water bandages applied for a few days will remove all of the soreness. If the parts are deeply cut more or less suppuration will follow, and, as a rule, it is well to poultice the parts for a day or two, after which cold baths may be used, or the wounds dressed with tincture of aloes, oakum, and a roller bandage.

When an animal is known to be subject to over-reaching, he should never be driven fast without quarter-boots, which are specially made for the protection of the heels and quarters.

If there is a disposition to "grab" the forward shoes, the trouble may be remedied by having the heels of these shoes made as short as possible, while the toe of the hind foot should project well over the hind shoe. When circumstances will permit of their use, the fore-feet may be shod with the tips instead of the common shoe, as described in the treatment for contracted heels.

Calk Wounds. Horses wearing shoes with sharp calks are liable to wounds of the coronary region, either from tramping on themselves, or on each other. These injuries are most common in heavy draught horses, especially on rough roads and slippery streets. The fore-feet are more liable than the hind ones, and the seat of injury is commonly on the quarters. In the hind-feet the wound often results from the animal resting with the heel of one foot set directly over the front of the other. In these cases the injury is generally close to the horn, and often involves the coronary band, the sensitive laminae, the extensor tendon, and even the coffin bone.

Treatment. Preventive measures would include the use of boots to protect the coronet of the hind-foot, and the use of a blunt calk on the outside heel of the fore shoe, since this is generally the offender where the fore-feet are injured. If the wound is not deep and the soreness slight, cold-water bandages and a light protective dressing, such as carbolyzed cosmoline, will be all that is needed. Where the injury is deep, followed by inflammation and suppuration of the coronary band, lateral cartilages, sensitive laminae, etc., active measures must be resorted to. In these cases cold, astringent baths, made by adding two ounces of sulphate of iron to a gallon of water, should be used, followed by poultices if it is necessary to hasten the cleansing of the wound by stimulating the sloughing process. Where the wound is deep between the horn and skin, especially over the anterior tendon, the horn should be cut away so that the injured tissues may be exposed. The subsequent treatment in these cases should follow the directions laid down in the article on toe-cracks.

Frost Bites. Excepting the ears, the feet and legs are about the only parts of the horse liable to become frost-bitten. The cases most commonly seen are found in cities, especially among car horses, where salt is used for the purpose of melting the snow on curves and switches. This mixture of snow and salt is splashed over the feet and legs, rapidly lowering the temperature of the parts to the freezing point. In mountainous districts where the snowfall is heavy and the cold often intense, frost bites are not uncommon even among animals running at large.

Symptoms. When the frosting is slight the skin becomes pale and bloodless, followed soon after by intense redness, heat, pain, and swelling. In these cases the hair may fall out and the epidermis peel off, but the inflammation soon subsides, the swelling disappears, and only an increased sensitiveness to cold remains.

In cases more severe, irregular patches of skin are destroyed, and after a few day's time slough away, leaving slow-healing ulcers behind. In the cases produced by low temperatures and deep snow the coronary band is the part most often affected.

In many instances there is no destruction of the skin, but simply a temporary suspension of the horn-producing function of the coronary band. The fore-feet are more often affected than the hind ones, and for some reason the heels and quarters are less often involved than the front part of the foot. The coronary band becomes hot, swollen and painful, and after two or three days' time the horn separates from the band and slight suppuration follows. For a few days the animal is lame, but as the suppuration disappears, the lameness subsides; new horn, often of an inferior quality, is produced by the coronary band, and in time the cleft is grown off and complete recovery is effected. The frog is occasionally frost bitten and may slough off, exposing the soft tissues beneath and causing severe lameness for a time.

Treatment. Simple frost bites are best treated by cold fomentations followed by applications of a five per cent. solution of carbolized oil. When portions of the skin are destroyed their early separation should be hastened by warm fomentations and poultices. Ulcers are to be treated by the application of stimulating dressings such as carbolized oil, a one per cent. solution of nitrate of silver or of chloride of zinc, with pads of oakum and flannel bandages. In many of these cases recovery is exceedingly slow. The new tissue by which the destroyed skin is replaced always shrinks in healing, and as a consequence unsightly scars are unavoidable. Where the coronary band is involved it is generally advisable to blister the coronet over the seat of injury as soon as the suppuration ceases, for the purpose of stimulating the growth of new horn. Where a crevasse is formed between the old and new horn, no serious trouble is likely to be met with until the cleft is nearly grown out, when the soft tissues may be exposed by a breaking off of the partly detached horn.

But even where this accident happens final recovery is secured by poulticing the foot until a sufficient growth of horn protects the part from injury.

Sprain of the Fetlock. Sprain of the fetlock joint is most common in the fore-legs, and as a rule affects but one at a time. Horses doing fast work, as trotters, runners, steeple-chasers, hunters, cow-ponies, and those that interfere, are particularly liable to the injury.

Causes. Horses knuckling at the fetlock, and all those with diseases which impair the powers of locomotion, such as navicular disease, contracted heels, side bones, chronic laminitis, etc., are predisposed to sprains of the fetlock. It generally happens from a misstep, stumbling, or slipping, which results in the joint being extended or flexed to excess. The same result may happen where the foot is caught in a rut, hole in a bridge, or in a car track, and the animal falls or struggles violently. Direct blows and punctured wounds may also set up the inflammation of the joint.

Symptoms. The symptoms of sprain of the fetlock vary with the severity of the injury. If slight there may be no lameness, but simply a little soreness, especially when the foot strikes on uneven ground, and the joint is twisted a little. In cases more severe the joint swells, is hot and puffy, and the lameness may be so intense as to compel the animal to hobble on three legs. While at rest the leg is flexed at the joint affected, and the toe rests on the ground.

Treatment. If the injury is slight, cold-water bandages and a few days' rest are sufficient to effect recovery. In cases where there is intense lameness, swelling, etc., the leg should be placed under a constant stream of cold water, as described in the treatment for quittor. When the inflammation has subsided a blister to the joint should be applied.

In some cases, especially in old horses long accustomed to fast work, the ligaments of the joints are ruptured, in whole or in part, and the lameness may last a long time. In these cases the joint should be kept completely at rest; and this condition is best secured by the application of the plaster of Paris bandages, as in cases of fracture. As a rule, patients take kindly to this bandage, and may be given the freedom of a roomy box or yard while wearing it. If they are disposed to tear it off, or if sufficient rest can not otherwise be secured, the patient must be kept in slings.

In the majority of instances the plaster bandage should remain on from two to four weeks. If the lameness returns when the bandage is removed, a new one should be put on. The swelling, which always remains after the other evidences of the disease have dissappeared, may be largely dissipated and the joint strengthened by the use of the firing iron and blisters.

A joint once injured by a severe sprain never entirely regains its original strength, and is ever after particularly liable to a repetition of the injury.

Thrush is a disease characterized by an excessive secretion of unhealthy matter from the cleft of the frog. While all classes of horses are liable to this affection, it is more often seen in the common draft horse than other breeds, a fact due to the conditions of servitude and not to the fault of the breed. Country horses are much less subject to the disease, except in wet, marshy districts, than are the horses used in cities and towns.

Causes. The most common cause of thrush is the filthy condition of the stable in which the animal is kept. Mares are more liable to contract the disease in the hind-feet when the cause is due to filth, while the gelding and stallion, are more likely to develop it in the fore-feet. Hard work, on rough and stony roads, may also induce the disease, as may a change from dryness to excessive moisture. The latter cause is often seen to operate in old truck horses, whose feet are constantly soaked in the bath-tub for the purpose of relieving soreness. Muddy streets and roads, especially where mineral substances are plentiful, excite this abnormal condition of the frog. Contracted feet, scratches, and navicular disease predispose to thrush, while by some a constitutional tendency is believed to exist among certain animals which otherwise present a perfect frog.

Symptoms. At first there is simply an increased moisture in the cleft of the frog, accompanied by an offensive smell. After a time a considerable discharge takes place (thin, watery, and highly offensive), changing gradually to a thicker uniform matter, which rapidly destroys the horn of the frog. Only in old and severe cases is the patient lame and the foot feverish, (cases in which the whole frog is involved in the diseased process).

Treatment. Thrushes are to be treated by cleanliness, the removal of all exciting causes, and a return of the frog to its normal condition. As a rule, the diseased and ragged portions of horn are to be pared away; and the foot poulticed for a day or two with boiled turnips, to which may be added a few drops of carbolic acid or a handful of powdered charcoal to destroy the offensive smell. The cleft of the frog and the grooves on the edges are then to be cleaned and well filled with dry calomel, and the foot dressed with oakum and a roller bandage. If the discharge is profuse the dressing should be changed daily, otherwise it may be left on for two or three days at a time. Where a constitutional taint is supposed to exist with swelling of the legs, grease, etc., a purgative followed by dram doses of sulphate of iron, repeated daily, may be pre-

scribed. In cases where the growth of horn seems too slow, a Spanish fly blister applied to the heels is often followed by good results. Feet in which the disease is readily induced may be protected in the stable with a leather boot. If the thrush is but a sequel to other diseases a permanent cure may not be possible.

Wind-galls. Joints and tendons are furnished with sacs containing a lubricating fluid called synovia. When these sacs are overdistended, by reason of an excessive secretion of synovia, they are called wind-galls. They form a soft, puffy tumor about the size of a hickory nut, and are most often found in the fore-leg, at the upper part of the fetlock joint, between the tendon and the shin-bone. When they develop in the hind-leg it is not unusual to see them reach the size of a walnut. Occasionally they appear in front of the fetlock on the border of the tendon. The majority of the horses are not subject to them after colthood is passed.

Causes. Wind-galls are often seen in young, over-grown horses, where the body seems to have outgrown the ability of the joints to sustain the weight. In cart and other horses used to hard work, in trotters with excessive knee action, in hurdle racers and hunters, and in most cow-ponies there is a pre-disposition to wind-galls. Street-car horses and others used to start heavy loads on slippery streets are the ones most apt to develop wind-galls in the hind legs.

Symptoms. The tumor is more or less firm and tense when the foot is on the ground, but is soft and compressible when the foot is off the ground. In old horses wind-galls generally develop slowly and cause no inconvenience. If they are caused by excessive tension of the joint the tumor develops rapidly, is tense, hot, and painful, and the animal is exceedingly lame. The patient stands with the joint flexed, walks with short steps, the toe only being placed on the ground. When the tumor is large and situated upon the inside of the leg it may be injured by interfering, causing stumbling and inflammation of the sac. Rest generally causes the tumor to diminish in size, only to fill up again after renewed labor. In old cases the tumors are hardened, and may become converted into bone by a deposit of the lime salts.

Treatment. The large, puffy joints of suckling colts, as a rule, require no treatment, for as the animal grows older the parts clean up, and after a time the swelling entirely disappears.

When the trouble is due to an injury, entire rest is to be secured by

the use of slings and a high-heeled shoe. Cold water douches should be used once or twice a day, followed by cold water bandages, until the fever has subsided and the soreness is largely removed, when a blister is to be applied.

In old wind-galls, which cause more or less stiffness, some relief may be had by the use of cold compress bandages, elastic boots, or the red iodide of mercury blisters. Enforced rest until complete recovery is effected should always be insisted on, as a too early return to work is sure to be followed by a relapse.

Bruise of the Frog. When the frog is severely bruised the injury is followed by suppuration beneath the horn, and at times by partial gangrene of the plantar cushion.

Causes. A bruise of the frog generally happens from the animal stepping on a rough stone or other hard object. It is more apt to take place when the animal is trotting, running, or jumping than when he is at a slower pace. A stone wedged between the branches of the shoe in the cleft of the frog, or between the sides of the frog and the shoe, and remaining for a time, produces the same results. A cut through the horny frog with some sharp instrument or a punctured wound with a blunt pointed instrument may also cause suppuration and gangrene of the plantar cushion. Broad, flat feet, with low heels and fleshy frog, are most liable to these injuries.

Symptoms. Lameness, severe in proportion to the extent of the bruise and the consequent suppuration, is always an early symptom. When the animal moves the toe only is placed to the ground, or the foot is carried in the air and the patient hobbles along on three legs. When he is at rest the foot is set forward with the toe resting on the ground and the leg flexed at the fetlock joint. As soon as the pus finds its way to the surface the lameness improves. If the frog is examined early the injured spot may usually be found, and if no opening exists the collection of pus may be detected working its way toward the heels. The horn is felt to be loosened from the deeper tissues, and if it is pared through, a thin, yellow, watery and offensive pus escapes. In other cases a ragged opening is found in the frog, leading down to a mass of dead, sloughing tissues, which are pale green in color if gangrene of the plantar cushion has set in. In rare cases the coffin bone may be involved in the injury and a small portion of it may become carious.

Treatment. If the injury is seen at once the foot should be placed in a bath of cold water with the object of preventing suppuration. If suppuration has already set in the horn of the frog, and of the bars and branches of the sole if necessary, is to be pared thin, so that all possible pressure may be removed and the foot poulticed. As soon as the pus has loosened the horn, all the detached portions are to be cut away. If the pus is discharging from an opening near the hair the whole frog, or one-half of it will generally be found separated from the plantar cushion, and is to be removed with the knife. After a few days' time the gangrene portion of the cushion will slough off under the stimulating effects of the poultice, and under rare circumstances only should the dead parts be removed by surgical interference. Where the slough is all detached the remaining wound is to be treated with simple stimulating dressings, such as tincture of aloes or turpentine, oakum balls, and bandages as directed in punctured wounds. The lameness having subsided, and a thin layer of new horn having grown on the exposed parts, the foot may be shod, the frog covered with a thick pad of oakum, held in place by pieces of tin fitted to slide under the shoe, and the animal returned to slow work.

Rupture of the Suspensory Ligament. Sprain, with or without rupture, of the suspensory ligament, may happen in both the fore and hind-legs, and is occasionally seen in horses of all classes and at all ages. Old animals, however, and especially hunters, runners, and trotters, are the most subject to this injury, and with these classes the seat of the trouble is nearly always in one, or both, the fore legs. Horses used for heavy draught are more liable to have the ligament of the hind-legs affected.

When the strain upon the suspensory ligament becomes too great one or both of the branches may be torn from their attachments to the sesamoid bones; one or both of the branches may be torn completely across; or the ligament may rupture above the point of division.

Symptoms. The most common injury to the suspensory ligament is sprain of the internal branch in one of the fore-legs. The trouble is proclaimed by lameness, heat, swelling and tenderness of the affected branch, beginning just above the sesamoid bone and extending obliquely downward and forward to the front of the ankle. If the whole ligament is involved the swelling comes on gradually, and is found above the fetlock and in front of the flexor tendons. The patient stands or walks

upon the toe as much as possible, keeping the fetlock joint flexed so as to relieve the ligament of tension.

When both branches are torn from their attachments to the sesamoids, or both are torn across, the lameness comes on suddenly and is most intense; the fetlock descends, the toe turns up and, as the animal attempts to walk, the leg has the appearance of being broken off at the fetlock. These symptoms, followed by heat, pain, and swelling of the parts at the point of injury will enable any one to make a diagnosis.

Treatment. Sprain of the suspensory ligament, no matter how mild it may be, should always be treated by enforced rest of at least a month, and the application of cold douches and cold water bandages, firmly applied until the fever has subsided, when a cantharides blister should be put on and repeated in two or three weeks' time, if necessary. When rupture has taken place the patient should be put in slings, and a constant stream of cold water allowed to trickle over the seat of injury until the fever is reduced. In the course of a week or ten days' time a plaster of Paris splint, such as is used in fractures, is to be applied and left on for a month or six weeks. When this is taken off blisters may be used to remove the remaining soreness; but it is useless to expect a removal of all the thickening, for in the process of repair new tissue has been formed which will always remain.

Corns. A corn is an injury to the living horn of the foot, involving at the same time the soft tissues beneath, whereby the capillary blood-vessels are ruptured and a small amount of blood escapes, which, by permeating the horn in the immediate neighborhood, stains it a dark color. If the injury is continuously repeated the horn becomes altered in character, the soft tissues may suppurate, causing the disease to spread, or a horny tumor may develop. Corns always appear in that part of the sole included in the angle between the bar and the outside wall of the hoof. In many cases the laminae of the bar, or of the wall, or of both, are involved at the same time.

Three kinds of corns are commonly recognized (the dry, the moist, and the suppurative), a division based solely on the character of the conditions which follow the primary injury.

The fore-feet are almost exclusively the subjects of the disease, for two reasons: first because they support a greater part of the body; secondly because the heel of the fore-foot during progression is first

placed upon the ground, whereby it receives much more concussion than the heel of the hind-foot, in which the toe first strikes the ground.

Causes. It may be said that all feet are exposed to corns, and that even the best feet may suffer from them when the conditions necessary to the production of the peculiar injury are present. The heavier breed of horses generally used for heavy work on rough roads and streets seems to be most liable to this trouble. Mules rarely have corns.

Among the causes which lead to corns may be named high heels, which change the natural position of the bones of the foot; contracted heels, which partly destroy the elasticity of the foot; long feet, which by removing the frog and heels too far from the ground, deprive them of necessary moisture, weak feet, or those in which the horn of the wall is too thin to resist the tendency to spread. Wide feet with low heels are always accompanied by a flat sole whose posterior wings either rest upon the ground or the shoe.

Improper shoeing either as a direct or a predisposing cause, produces many corns. One of the most serious as well as the most common of the errors in shoeing is to be found in the preparation of the foot for the shoe. Instead of seeking to maintain the strength of the arch the first thing done is to weaken it by paring away the sole; the mutilation does not end here, for the frog is also largely cut away. This permits an excessive downward movement of the contents of the horny box, and at the same time removes the means by which concussion of the foot is destroyed. There is also faulty construction of the shoe and the way it is adjusted to the foot. An excess of concavity in the shoe, by extending it too far back on the heels, high calks, thin heels which permit the shoe to spring, short heels with a calk set under the foot, and a shoe too light for the animal wearing it or for the work required of him, are all to be avoided as causes of corns. A shoe so set as to press upon the sole, or one that has been on so long that the hoof has overgrown it until the heel rests upon the sole and bars, becomes a direct cause of corns. Small stones, hard dry earth, or other objects which collect between the sole and shoe is often the cause of corns. Lastly, a rapid gait and excessive knee action, especially on hard roads, predispose to this disease of the feet.

Symptoms. Usually a corn causes enough pain to cause lameness. It may be intense as seen in suppurative corn, or it may be a slight soreness, such as that which accompanies dry corn. It is by no means un-

usual to see old horses having chronic corns, apparently so accustomed to the slight pain which they suffer as not to limp at all; but these animals are generally very restless; they paw their bedding behind them at night, and in many instances they refuse to lie down for any lengthened rest. The lameness of this disease, however, can hardly be said to be characteristic, for the reason that it varies so greatly in intensity; but the position of the leg while the patient is at rest is generally the same in all cases. The foot is so advanced that it is relieved of all weight and the fetlock is bent until all pressure by the contents of the hoof is removed from the heels. In suppurative (festered) corn the lameness disappears as soon as the abscess has opened. When the injured tissues are much inflamed, as may happen in severe and recent cases, the heel of the affected side, or even the whole foot is hot and tender to pressure. In dry corn, and in most chronic cases, all evidences of local fever are often wanting. It is in these cases that the patient goes well when newly shod, for the smith cuts away the sole over the seat of injury until all pressure by the shoe is removed, and lowers the heel so that the concussion is reduced to a minimum. If a corn is suspected the foot should be examined for increased sensibility of the inside heel. Tapping the heel of the shoe with a hammer and grasping the wall and bar between the jaws of a pinchers, with moderate pressure, will cause more or less flinching if the disease is present. For further evidence the shoe is removed and the heel cut away with the drawing knife. As the horn is pared out not only the sole in the angle is discolored, but, in many instances, this insensible laminæ of the bar and wall adjacent are also stained with the escaped blood. In moist and suppurative corns this discoloration is less marked than in dry corn and may even be entirely wanting. In these cases the horn is soft, often white, stringy or mealy, as seen in pumiced sole resulting from founder. When the whole thickness of the sole is discolored and the horn dry and brittle it is generally evidence that the corn is an old one and that the exciting cause has existed continuously. A moist corn differs from the dry corn in that the injury is more severe, the parts affected are more or less inflamed, and the horn of the sole in the angle is undermined by a citron-colored fluid, which often permeates the injured sole and laminæ, causing the horn to become somewhat spongy.

A suppurative corn differs from the others in that inflammation accompanying the injury ends in suppuration. The pus collects at the point of injury and finally escapes by working a passageway between

the sensitive and insensitive laminæ to the top of the hoof, where an opening is made by the separation of the wall from the coronary band at or near the heels. This is the most serious form of corns, for the reason that it may induce gangrene of the plantar cushion, cartilaginous quittor, or carries of the coffin bone.

As in all other troubles, the cause must be discovered if possible, and removed. In the great majority of cases the shoeing will be at fault. While sudden changes in the method of shoeing are not advisable, it may be said that all errors, either in the preparation of the foot, in the construction of the shoe, or in its application, may very properly be corrected at any time. Circumstances may, at times, make it imperative that shoes shall be worn which are not free from objections, as, for instance, the shoe with a high calk; but in such cases it is considered that the injuries liable to result from the use of calks are less serious than those which are sure to happen for the want of them.

For a sound foot, perfectly formed, a flat shoe, with heels less thick than the toe, and which rests evenly on the wall proper, is the best. In flat feet it is often necessary to concave the shoe as much as possible on the upper surface, so that the sole may not be pressed upon. If the heels are very low the heels of the shoe may be made thicker. If the foot is very broad and the wall light toward the heels, a bar shoe, resting upon the frog, will aid to excessive tension upon the soft tissues when the foot receives the weight of the body. A piece of leather placed between the foot and the shoe serves to largely destroy concussion, and its use is absolutely necessary on some animals in that they may be kept at work.

Lastly, among the preventive measures, may be mentioned those which serve to maintain the suppleness of the hoof. The dead horn upon the surface of the sole not only retains moisture for a long time, but protects the living horn beneath from the effects of evaporation, and for this reason the sole should be pared as little as possible. Stuffing the feet with flaxseed meal, wet clay, or other like substances; damp dirt floors or damp bedding of tan-bark, greasy hoof ointments, etc., are all means which may be used to keep the feet from becoming too dry and hard.

As to the curative measures which are adopted much will depend upon the extent of the injury. If the case is one of chronic dry corn, with but slight lameness, the foot should be poulticed for a day or two and the discolored horn pared out, care being taken not to injure the soft

tissues. The heel on the affected side is to be lowered until all pressure is removed, and, if the patient's labor is required, the foot must be shod with a bar shoe or with one having stiff heels. Care must be taken to reset the shoe before the foot has grown too long, else the shoe will no longer rest on the wall but on the sole and bar.

In moist corns cut them out. If there is inflammation present, cold baths and poultices should be used; when the horn is well softened and the fever allayed, pare out all of the diseased horn, lightly cauterize the soft tissues beneath, and poultice the foot for two or three days. When the granulations look red dress the wound with oakum balls saturated in a weak solution of tincture of aloes or spirits of camphor, and apply a roller bandage. Change the dressing every two or three days until a firm, healthy layer of new horn covers the wound, when the shoe may be put on, as in dry corn, and the patient returned to work.

In suppurative corns the loosened horn must be removed so that the pus may freely escape. If the pus has worked a passage to the coronary band, and escapes from an opening between the band and hoof, an opening must be made on the sole, and cold baths, made astringent with a little sulphate of iron or copper, are to be used for a day or two. When the discharge becomes healthy the fistulous tracts may be injected daily with a weak solution of bichloride of mercury, nitrate of silver, etc., and the foot dressed as for the operation for moist corns.

Contracted Heels. Contracted heels, or hoof-bound as it is sometimes called, is a common disease, especially among horses kept on hard floors in dry stables, and in such as are subject to much saddle work. It consists in shrinking of the tissues of the foot, whereby the lateral diameter of the heels is diminished. It affects the fore-feet principally, but is seen occasionally in the hind-feet, where it is of less importance for the reason that the hind-foot strikes the ground with the toe, and, consequently, less expansion of the heel is necessary than in the fore-feet where the weight is first received on the heels, and any interference with the expansibility of this part of the foot interferes with locomotion and gives rise to lameness.

Usually but one foot is affected at a time, but when both are diseased the change is greater in one than in the other. Occasionally but one heel, and that the inner one, is contracted; in these cases there is less likely to be lameness and permanent loss of the animal's usefulness. According to the opinion of some of the French veterinarians, hoof-

bound should be divided into two classes—total contraction, in which the whole foot is shrunken in size, and contraction of the heels, when the trouble extends only from the quarters backward.

Causes. Animals raised in wet or marshy districts, when taken to towns and kept on dry floors, are liable to have contracted heels, not alone because the horn becomes dry but because fever of the feet and wasting away of the soft tissues result from the change. Another common cause of contracted heels is to be found in faulty shoeing, such as rasping the wall, cutting away the frog, heels, and bars; high calks and the use of nails too near the heels. Contracted heels may happen also as one of the results of other diseases of the foot; for instance, it often accompanies thrush, side-bones, ring-bones, canker, navicular disease, corns, sprains of the flexor tendons, of the sesamoid and suspensory ligaments, and from excessive knuckling of the fetlock joints.

Symptoms. In contraction of the heels the foot has lost its circular shape, and the walls from the quarters backward approach to a straight line. The ground surface of the foot is now smaller than the coronary circumference; the frog is pinched between the inclosing heels, is much shrunken, and at times affected with thrush. The sole is more concave than natural, the heels are higher, and the bars are long and nearly perpendicular. The whole hoof is dry, and so hard that it can scarcely be cut; the parts toward the heels are scaly and often rigid like the horns of a ram, while fissures, more or less deep, may be seen at the quarters and heels following the direction of the horn fibers. When the disease is well advanced lameness is present; in the earlier stages there is only an uneasiness evinced by frequent shifting of the affected foot or feet. Stumbling is common, especially on hard or rough roads. In most cases the animal comes out of the stable stiff and inclined to walk on the toe, but after exercise he may go free again. He wears his shoes off at the toe in a short time, no matter whether he works or remains in the stable. If the shoe is removed and the foot pared, in old cases a dry, mealy horn where the sole and horn unite, extending upward in a narrow line toward the quarters.

Treatment. First of all, the preventive measures must be considered. The feet must be kept moist and the horn be prevented from drying out by the use of moist sawdust or other damp bedding; by occasional poultices of boiled turnips, linseed meal, etc., and the use of greasy hoof ointments to both the sole and walls of the feet. The wall

of the foot should be spared from the abuse of the rasp; the frog, heels, and bars are not to be mutilated with the knife, nor should calks be used on the shoe except when absolutely necessary. The shoes should be reset at least once a month, to prevent the feet from becoming too long, and daily exercise must be insisted on.

As to curative measures a diversity of opinion exists. A number of kinds of special shoes have been invented, having for an object the spreading of the heels, and perhaps any of these, if properly used, would eventually effect the desired result. But a serious objection to most of these shoes is that they are expensive and often difficult of make and application. The following method of treatment in these cases is not only attended with good results, but is inexpensive, if the loss of the patient's services for a time is not considered a part of the question. It consists, first, in the use of poultices or baths of cold water for a few days until the horn is thoroughly softened. The foot is now prepared for the shoe in the usual way, except that the heels are lowered a little, the frog remaining untouched. A shoe called a "tip" is made by cutting off both branches at the center of the foot and drawing the ends down to an edge. The tapering of the branches should begin at the toe, and the shoe should be of the usual width, with both the upper and lower surfaces flat. This tip is to be fastened on with six or eight small nails, all set well forward, two being in the toe. With a common foot rasp begin at the heels, close to the coronet, and cut away the horn of the wall until only a thin layer covers the soft tissues beneath. Cut forward until the new surface meets the same two and one-half to three inches from the heel. The same sloping shape is to be observed in cutting downward toward the bottom of the foot, at which point the wall is to retain its normal thickness. The foot is now blistered all around the coronet with Spanish fly ointment, and when this is well set the patient is to be turned to pasture in a damp field or meadow. The blister should be repeated in three or four weeks, and, as a rule, the patient can be returned to work in two or three months' time. The object of the tip is to throw the weight on the frog and heels, which are readily spread after the horn has been cut away on the sides of the wall. The internal structures of the foot at the heels, being relieved from excessive pressure, regain their normal condition if the disease is not of too long standing. The blister not only tends to relieve any inflammation which may be present, but it also stimulates a rapid growth of healthy horn, which, in most cases, ultimately forms a wide and normal heel.

Canker. Canker of the foot is a disease due to the rapid reproduction of a vegetable parasite. It not only destroys the sole and frog, but by setting up a chronic inflammation in the deeper tissues, prevents the growth of a healthy horn by which the injury might be repaired. Heavy cart horses are more often affected than those of any other class.

Causes. The essential element in the production of cankers is of course the presence of the parasite; consequently the disease may be called contagious. But, as in all other diseases due to specific causes, the seeds of the disorder must find a suitable soil in which to grow before they are reproduced. It may be said, then, that the conditions which favor the preparation of the tissues for a reception of the seeds of this disease are simply predisposing causes.

The condition most favorable to the development of cankers is dampness—in fact, dampness seems indispensable to the existence and growth of the parasite; for the disease is rarely, if ever, seen in high, dry districts, and is much more common in rainy than in dry seasons. Filthy stables and muddy roads have been classed among the causes of canker; but it is very doubtful if these conditions can do more than favor a preparation of the foot for the reception of the disease germ.

All injuries to the feet may, by exposing the soft tissues, render the animal susceptible to infection; but neither the injury nor the irritation and inflammation of the tissues which follow, are sufficient to induce the disease.

For some unknown reasons horses with lymphatic temperament, thick skins, flat feet, fleshy frogs, heavy hair, and particularly with white feet and legs, are especially liable to canker.

Symptoms. Usually, canker is confined to one foot; but it may attack two, three, or all of the feet at once; or, as is more commonly seen, the disease attacks first one then another, until all may have been successively affected. When the disease follows an injury which has exposed the soft tissues of the foot the wound shows no tendency to heal, but, instead, there is secreted from the inflamed parts a profuse, thin, fetid, watery discharge, which gradually undermines and destroys the surrounding horn, until eventually a large part of the sole and frog is diseased. The living tissues are swollen, dark-colored, and covered at certain points with particles of new, soft, yellowish, thready horn, which are constantly undergoing maceration in the abundant liquid secretion by which they are immersed. As this escapes to the sur-

rounding parts it dries and forms small cheesy masses composed of the partly dried horny matter, exceedingly offensive to the sense of smell. When the disease originates independently of an injury, the first evidences of the trouble are the offensive odors of the foot, the liquid secretion from the cleft and sides of the frog, and the rotting away of the horn of the frog and sole.

In the earlier stages of the disease there is no interference with local motion, but later the foot becomes sensitive, particularly if the animal is used on rough roads, and, finally, when the sole and frog are largely destroyed the lameness is severe.

Treatment. Since canker does not destroy the power of the tissues to produce horn, but rather excites them to an excessive production of an imperfect horn, the indications for treatment are to restore the parts to a normal condition when healthy horn may again be secreted. In my experience, limited though it has been, the old practice of stripping off the entire sole and deep cauterization, with either the hot iron or strong acids, is not attended with uniformly good results.

I am of the opinion that recovery can generally be effected as surely and as speedily with measures which are less heroic and much less painful. True, the treatment of canker is likely to exhaust the patience, and sometimes the resources, of the attendant; but after all success depends more on the persistent application of simple remedies and great cleanliness than on the special virtues of any particular drug.

First, then, clean the foot with warm baths, and apply a poultice containing powdered charcoal or carbolic acid. A handful of the charcoal, or a table-spoonful of the acid, mixed with the poultice serves to destroy much of the offensive odor. The diseased portions of horn now to be carefully removed with sharp instruments, until only healthy horn borders the affected parts. The edges of the sound horn are to be pared thin, so that the swollen soft tissues may overlap their borders. With sharp scissors cut off all the prominent points on the soft tissues, shorten the walls of the foot, and nail on a broad, plain shoe. The foot is now ready for the dressings, and any of the many stimulating and drying remedies may be used. Whichever is selected at the outset, it will be necessary to change frequently from one to another, until all may be tried.

The list from which a selection may be made comprises wood tar, gas tar, petroleum, cresote, phenic acid, sulphates of iron, copper and zinc, chloride of zinc, bichloride of mercury, calomel, caustic soda, nitrate of silver, chloride of lime, carbolic, nitric, and sulphuric acids.

In practice I prefer to give the newly shod foot a bath for an hour or two in a solution of the sulphate of iron, made by adding two ounces of powdered sulphate to a gallon of cold water. When the foot is removed it is dressed with oakum balls, dipped in a mixture made of Barbadoes tar, one part; oil of turpentine, eight parts, to which are slowly added two parts of sulphuric acid, and the mixture well stirred and cooled. The diseased parts being well covered with the balls, a pad of oakum, sufficiently thick to cause considerable pressure, is placed over them, and all are held in place by pieces of heavy tin fitted to slip under the shoe. The whole foot is now encased in a boot or folded gunny sack, and the patient turned into a loose, dry box. When they are removed all pieces of new horny matter, which are not firmly adherent must be rubbed off with the finger or a tent of oakum. As the secretion diminishes dry powders may prove of most advantage, such as calomel, sulphates of iron, copper, etc. The sulphates should not be used pure, but are to be mixed with powdered animal charcoal in the proportion of one of the former to eight or ten of the latter. When the soft tissues are all horned over, the dressings should be continued for a time, weak solutions being used to prevent a recurrence of the disease. If the patient is run down in condition, bitter tonics, such as gentian, may be given in two-dram doses, twice a day, and a liberal diet of grain allowed.

Side-Bones. A side-bone consists in a transformation of the lateral cartilages found on the wings of the coffin bone into bony matter by the depositing of lime salts. The disease is a common one, especially in heavy horses used for draft, in cavalry horses, cow-ponies, and other saddle horses, and in runners and trotters.

Side-bones are peculiar to the fore-feet, yet they occasionally develop in the hind-feet where they are of little importance, since they cause no lameness. In many instances side-bones are of slow growth, and being unaccompanied by acute inflammation, they cause no lameness until such time as, by reason of their size, they interfere with the action of the joint.

Causes. Side-bones often grow in heavy horses without any apparent injury, and their development has been attributed to the over-expansion of the cartilages caused by the great weight of the animal. Blows, and other injuries to the cartilages, may set up an inflammatory process which ends in the formation of these bony growths. High-heeled shoes, high calks, and long feet are always classed among the conditions which may excite the growth of side-bones. They are often

seen in connection with contracted heels, ringbones, navicular diseases, punctured wounds of the foot, quarter crack, and occasionally as a sequel to founder.

Symptoms. In the earlier stages of the disease, if inflammation is present, the only evidence of the trouble to be detected is a little fever over the seat of the affected cartilage and a slight lameness. In the lameness of side-bones the toe of the foot first strikes the ground and the step is shorter than natural. The subject comes out of the stable stiff and sore, but the gait is more free after exercise.

Since the deposit of the bony matter often begins in that part of the cartilage where it is attached to the coffin bone, the diseased process may exist for some time before the bony growth can be seen or felt. Later on, however, the cartilage can be felt to have lost its soft elastic character, and by standing in front of the animal a prominence of the coronary region at the quarters can be seen. Occasionally these bones become so large as to bulge the hoof outward, and by pressing on the joint they so interfere with locomotion that the animal becomes entirely useless.

Treatment. As soon as the disease can be determined active treatment should be adopted. Cold water bandages are to be used for a few days to relieve the fever and soreness.

The improvement consequent on the use of these simple measures often leads to the belief that the disease has recovered; but with a return to work the lameness, fever, etc., reappears. For this reason the use of blisters, or better still the firing iron, should follow on the discontinuance of the cold bandages.

But in many instances no treatment will arrest the growth of these bony tumours, and as a palliative measure neurotomy must be resorted to. Generally this operation will so relieve the pain of locomotion that the patient may be used for slow work; but in animals used for faster driving or for saddle purposes the operation is practically useless. Years ago a number of cavalry horses at Fort Leavenworth that were suffering from side-bones, were unnerved and the records show that in less than seven months' time all were more lame than ever. Since a predisposition to develop side-bones may be inherited, animals suffering from this disease should not be used for breeding purposes unless the trouble is known to have originated from an accident.

Ringbone. A ringbone is the growth of a bony tumour on the ankle. This tumour is in fact not the disease, but simply the result

affected by an inflammatory action set up in the periosteum and bone tissue proper of the large and small pastern bones.

Causes. Injuries, such as blows, sprains, overwork in young undeveloped animals, fast work on hard roads, jumping, etc., are among the principal exciting causes of ringbones. Horses most disposed to this disease are those with short upright pasterns, for the reason that the shock of locomotion is but imperfectly dissipated in the fore-legs of these animals. Improper shoeing, such as the use of high calks, a too great shortening of the toe and correspondingly high heels; predispose to this disease by increasing the concussion to the feet.

Symptoms. The first symptom of an actively developed ringbone is the appearance of a lameness more or less acute. If the bony tumour forms on the side or upper parts of the large pastern its growth is generally unattended with acute inflammatory action, and, consequently, produces no lameness or evident fever. These are called false ringbones. But when the tumours form on the whole circumference of the ankle, or simply in front under the extensor tendon, or behind under the flexor tendon; or if they involve the joints between the two pastern bones, or between the small pastern and the coffin bone, the lameness is always severe. These constitute the true ringbone. Besides the lameness the ankle of the affected limb presents more or less heat, and in many instances a rather firm, though limited, swelling of the deeper tissues over the seat of the inflammatory process. The lameness of ringbone is characteristic in that the heel is first placed on the ground when the disease is in a fore-leg, and the ankle is kept as rigid as possible. In the hind-leg, however, the toe strikes the ground first when the ringbone is high on the ankle, just as in health; but the ankle is maintained in a rigid position. If the bony growth is under the front tendon of the hind-leg, or if it involves the coffin joint, the heel is brought to the ground first. In the early stages of the disease it is not always easy to diagnose ringbone; but when the deposits have reached some size they can be felt and seen as well.

The importance of a ringbone of course depends on its seat, and often on its size. If it interferes with the joints, or with the tendons, it may cause an incurable lameness even though small. If it is on the sides of the large pastern, the lameness generally appears as soon as the tumour has reached its growth and the inflammation subsides. Even where the pastern joint is involved, if complete ankylosis results, the patient may recover from the lameness with simply an imperfect action of the foot remaining, due to the stiff joint.

Treatment. Before the bony growth has commenced, the inflammatory process may be cut short by the use of cold baths and wet bandages, followed by one or more blisters. If the bony deposits have begun, the firing iron should always be used. Even where the tumours are large and the pastern joint involved, firing often hastens the process of anchylosis, and should always be tried.

Where the lower joint is involved, or where the tumour interferes with the action of the tendons, of course recovery is not to be expected. In many of these latter cases, however, the animal may be made serviceable by proper shoeing. If the patient walks with the toe on the ground the foot should be shod with a high-heeled shoe and a short toe. On the other hand, if he walks on the heel a thick-toed and thin heeled shoe must be worn.

Since ringbone is considered to be one of the hereditary diseases no animal suffering from this trouble should ever be used for breeding purposes.

Spavin. This affection, popularly termed BONE SPAVIN, is a disease of the hock joint. The general impression is that in a spavined hock, the bony growth should be seated on the front and internal of the joint, and this is partially correct, as such a growth will constitute a spavin in the most correct sense of the term. But an enlargement may appear on the upper part of the hock also, or possibly a little below the inner side of the lower extremity of the shank bone, forming what is known as a HIGH SPAVIN; or, again, the growth may form just on the outside of the hock and become an OUTSIDE or EXTERNAL SPAVIN. And, finally, the entire under surface may become the seat of the bony deposit, and involve the internal face of all the bones of the hock, and this again is a BONE SPAVIN. There would seem, then, to be but little difficulty in comprehending the nature of a bone spavin, and there would be none but for the fact that there are similar affections which might confuse if careful and intelligent examination is not made.

The hock may be spavined, while to all outward appearance it still retains its perfect form. With no enlargement tangible to sight or touch the animal may be disabled by an OCCULT SPAVIN, which has resulted from a union of several of the bones of the joint, and it is only those who are able to realize the importance of its action to the perfect fulfillment of the full power of action of the hind leg, who can comprehend the gravity of the trouble. No diseases, if we accept those acute inflammatory attacks upon vital organs to which the patient succumbs at once,

are more destructive to the usefulness and value of a horse than a confirmed spavin. Serious in its starting, serious in its progress, it is a trouble which, when once established, becomes a fixed condition which there are no known means of dislodging. The inflammation of the periosteum which it nearly always follows, is usually the effect of some cause operating upon the complicated structure of the hock, such as a sprain which has torn a ligament insertion and lacerated some of its fibers; or a violent effort in jumping, galloping, or trotting, to which the victim has been compelled by the torture of whip and spur while in use by a sporting owner, under the pretext of "improving his breed"; or the extra exertion of starting too heavy a load; or an effort to recover his balance from a misstep; or slipping upon an icy surface; or sliding with worn shoes upon a bad pavement, and other kindred causes. Further there are families of horses in which this condition has been transmitted from generation to generation, and animals otherwise of excellent formation rendered valueless by the misfortune of inherited spavin.

The evil is of the most serious character for other reasons, among which may be named the slowness of their development and the determined growth. Among the signs that may be mentioned as indicating this condition is a peculiar posture assumed by the patient while at rest, and becoming at length so habitual that it can not fail to suggest the action of some hidden cause. The posture is due to the action of the abductor muscles, of the lower part of the leg being carried inward, and the heel of the shoe resting on the toe of the opposite foot. Then an unwillingness may be noticed in the animal to move from one side of the stall to the other. When driven he will travel stiffly, and with a sort of sidelong gate between the shafts, and after finishing his task and resting again in his stall, will pose with the toe pointing forward, the heel raised, and the hock bent. Some little heat and considerable amount of inflammation soon appears. The slight lameness which appears when backing out of the stall ceases to be noticeable after a short distance of travel.

A minute examination of the hock will then begin to reveal the existence of a bony enlargement which may be detected just at the junction of the hock and the cannon bone, on the inside and a little in front, and evident to both sight and touch. This enlargement or BONE SPAVIN grows rapidly and persistently and soon acquires dimensions which render it impossible to doubt any longer its existence or its nature. The argument obtained by some that because these bony deposits are frequently

found on both hocks they are not spavins, is wrong. If they are discovered on both hocks, it proves that they are not confined to a single joint.

The peculiar lameness of bone spavin, as it affects the motion of the hock joint, presents two conditions. In one class of cases it is most pronounced when the horse is cool, in the other when he is at work. The first is shown by the fact that when the animal travels the toe first touches the ground, and the heel descends more slowly, the motion of bending at the hock taking place stiffly, and accompanied by a dropping of the hip on the opposite side. In the other case the peculiarity is that the lameness increases as the horse travels; that when he stops he seeks to favor the same leg, and when he resumes his work soon after he steps much on his toe, as in the first variety.

As with sidebones, though for a somewhat different reason, the dimensions of the spavin and the degree of the lameness do not seem to bear any relation, the greatest lameness at times accompanying a very small growth. But the distinction between the two varieties of COOL and WARM may easily be determined by remembering the fact that in a majority of cases the first, or COOL, is due to a simple exostosis, while the second is generally connected with disease of the articulation, such as ulceration of the articular surface.

It is seldom that the advantage of an early knowledge of a spavin existing can be secured, and when the true nature of the trouble has become apparent it is usually too late to resort to the remedial measures which, if duly forewarned, might have been employed. But for the loss of the time wasted in the treatment of purely imaginary ailments very many cases of bone spavin may be arrested when starting and their victims preserved for years of comfort for themselves and valuable labor to their owners.

To consider a hypothetical case: An early discovery of lameness has been made; that is, the existence of an acute inflammation has been detected. The increased temperature of the parts has been observed, with the stiffened gait and the peculiar pose of the limbs and the question is asked, "What is to be done?" Even with only these very doubtful symptoms (doubtful with the non-expert) direct your treatment to the hock in preference to any other joint, since of all the joints of the hind leg it is this which is most liable to be attacked, a natural result from its peculiarities of structure and function. And in answer to the query, "What is to be done?" we should answer REST, (emphatically, and as

an essential condition, REST.) Whether only threatened, suspected, or positively diseased, the animal must be entirely relieved from labor, and it must be no partial or temporary quiet of a few days. In all stages and conditions of the disease, whether the spavin is nothing more than a simple inflammation, or whether accompanied by a complication, there must be rest until the danger is over. Less than a month's quiet ought not to be thought of, the longer the rest, the better.

Good results may be expected from local applications. There are various applications which cool the parts, the astringents which lower the tension of the blood vessels, the warm fomentations which aid the circulation in the congested capillaries, the liniments of various composition, the stimulants, the opiate anodynes, the sedative preparations of aconite, the alterative frictions of iodine, recommended and prescribed by one or another. The best are counter-irritants, for the simple reason, among many others, that they tend by the promptness of their action to prevent the formation of the bony deposits. The lameness will often yield to the blistering action of cantharides, in the form of ointment or liniment, and to the alterative preparations of iodine or mercury. And if the owner of a spavined horse really succeeds in removing the lameness, he has accomplished all that he is justified in hoping for; beyond this let him be well persuaded that a "cure" is impossible.

For this reason, be on guard against the patented "cures" which the traveling horse doctor may urge upon you, and withhold your faith from the circular of the agent who will deluge you with references and certificates. It is possible that nostrums may in some instances prove of service, but the greater number of them are capable of producing only bad effects. The removal of the bony tumor can not be accomplished by such means, and if a trial of these unknown compounds should be followed by nothing worse than the forming of one or more ugly, hairless spots, it will be well for the horse.

Rest and counter-irritation, with the proper medicines, constitute, then, the prominent points in the treatment designed for the relief of bone spavin. Yet there are cases in which all the agencies and methods referred to seem to lack effectiveness and fail to produce satisfactory results. Either the rest has been prematurely interrupted, or the blisters have failed to rightly modify the serous infiltration, or the case in hand has some hidden characteristics which seem to have rendered the disease neutral to the means used to cure it. An indication of more energetic

means is then presented, and free cauterization with the fire-iron becomes necessary.

At this point a word of explanation in reference to this operation of firing may be appropriate for the satisfaction of any who may entertain an exaggerated idea of its severity and possible cruelty.

The operation is one of simplicity, but is nevertheless one which, in order to secure its benefits, must be reserved for times and occasions of which only the best knowledge and highest discretion should be allowed to judge. It is not the mere application of a hot iron to a given part of the body which constitutes the operation of firing. It is the methodical and scientific introduction of heat into the structure with a view to a given effect upon the diseased organ or tissue. The first is one of the degrees of mere burning. The other is scientific cauterization, and is a surgical manipulation.

Either firing alone or stimulation with blisters is of great efficacy for the relief of lameness from bone spavin. Failure to produce relief after a few applications and after allowing a sufficient interval of rest, should be followed by a second, or, if needed, a third firing.

Blood Spavin and Thoroughpins. The complicated arrangement of the hock joint, and the powerful tendons which pass on the posterior part, are lubricated with the product of secretion from one tendinous synovial and several articular synovial sacs. One large articular sac contributes to the lubrication of the shank bone (the tibia) and the bones of the hock proper (the astragalus). The tendinous sac lies back of the articulation itself, and extends upwards and downwards in the groove of that joint through which the flexor tendons slide. The dilatation of this articular synovial sac is what is denominated blood spavin, the term thoroughpin being applied to the dilatation of the tendinous capsule.

BLOOD SPAVIN is situated in front and a little inward of the hock; the THOROUGHPIN is found at the back and on the top of the hock. The former is round, smooth, well defined, presenting on its outer surface, running from below upwards, a vein which is more or less prominent as the bursa is more or less dilated, and it is from this conspicuous blood vessel that the tumor derives its name. The thoroughpin is also round and smooth, but not so regularly formed, on each side and a little in front of the tendons in that part of the hock known as the

"hollows," immediately back of the posterior face of the tibia or shank bone.

In their general characteristics these tumors are similar to windgalls, and one description of the origin, symptoms, changes, and treatment will serve for all equally, except that it is possible for a blood spavin to cause lameness, and thus to involve a verdict of unsoundness in the patient, a circumstance which will of course justify its classification by itself as a severer form of a single type of disease.

The treatment and the means employed should be (REST, of course) with liniments, blisters, etc., and EARLY, DEEP, and well-performed CAUTERIZATION. There are, besides, commendatory reports of a form of treatment by the application of pads and peculiar bandages upon the hocks, and it is claimed that the removal of the tumors has been affected by their use. But experience with this apparatus has not been accompanied by such favorable results as would justify indorsement of the flattering representations which have sometimes appeared in its behalf.

Stringhalt. The characteristic symptom of this disease is the spasmodic bending, more or less violent, of the hock, sometimes to the extent of striking the abdomen with the fetlock of the affected leg, and at others only sufficient to lift it a few inches from the ground, but always with the same sudden, uncontrollable jerk. The habit is not affected by the gait of the animal, and whether trotting, walking, or merely turning around, it is all the same. It does not seem to be influenced by the horse's age, young and old being troubled the same. Its first appearance sometimes is very slight. It has been noticed in animals when backing out of the stable and ceasing immediately after. In some animals it is best seen when the animal is turning around on the affected leg, and is not noticed when he moves straight forward. That this peculiar action interferes with quickness of motion and lessens a horse's claim to soundness can not for a moment be denied.

Veterinarians are yet in doubt in respect to the cause of this trouble, as well as to its nature. They know not whether it results from disease of the hock, of an ulcerative character; whether it springs from a malformation; whether it is purely a muscular or purely a nervous lesion, or a compound of both. Stringhalt still continues to be the puzzle of the veterinarian.

Various experiments in the line of treatment have been tried, but none have been crowned with satisfactory results. Perhaps some un-

designated disease of the hock is responsible for it, and in the present state of knowledge the best prescription that can be devised is the safe and economical one of rest, a long rest in a pasture, where unmolested nature shall be permitted to bring about any necessary change that may be appropriate to the case.

Interfering. The results from interfering are not often very serious. However violent the blow may be it is rarely that complications of a troublesome nature occur. The chief evil attending it is a liability to be followed by a thickened skin for a callous which is an eyesore and a blemish. The remark than "an animal which has interfered once is always liable to interfere," is often confirmed and sanctioned by a recurrence of the trouble.

A point in which there is a resemblance between this trouble and others which we have considered is in its yielding to the same treatment. Indeed the prescription of warm fomentations, soothing applications, and astringent and resolvent mixtures, in a majority of cases, is the first that occurs all through the list. If the swelling assumes the character of a serous collection, pressure, cold water and bandages will contribute to its removal. If festering seems to be established, and the swelling assumes the character of a developing abscess, the hot poultices of flaxseed or of boiled vegetables and the use of basilicon, or propuleum, ointments containing preparations of opium or belladonna, recommend themselves by their general usefulness and the beneficial results which have followed their application, not less in one case than in another. When an abscess has formed and is ripening, it should be carefully but fully opened to let out the pus. If it is a serous cyst, some care is necessary in emptying it, and the possibility of the extension of the inflammation to the joint must be taken into consideration. When the cavities have been emptied and have closed by filling up with granulations (scabs), or if, not being opened, the contents have been reabsorbed, and there remains in either case a plastic scab and a tendency to the callous organization that may yet exist, blisters under their various forms, including those of cantharides, mercury, and iodine should then be used chiefly in the early stages, as it is then that their effects will prove most satisfactory. The use of the actual cautery, with fine points, penetrating deeply throughout the enlargement, has when employed in the early stages, nearly always hastened recovery with complete absorption of the thickening.

Founder or Laminitis. This in its simple form is inflammation of the sensitive laminae which cover the outer and upper surface of the coffin bone. The laminae consist of five or six hundred very fine folds, which are profusely supplied with blood-vessels and nerves.

This inflammation is of a character similar to that which attends inflammation of the skin and mucous membranes, producing no constitutional disturbances except those dependent upon the local disease. In severe cases it has a strong tendency to destroy destructive disorganization of the tissues affected.

Causes. These are wide and variable and may be divided into **PREDISPOSING** and **EXCITING**.

PREDISPOSING CAUSES. A predisposing cause exists to an extent in those animals unaccustomed to work, particularly if they are inactive, and in all those that have had previous attacks of the disease, for the same rule holds good here that we find in so many diseases: i. e., that one attack impairs the activity of the affected tissues and thus renders them more subject to a subsequent inflammation.

Unusual excitement by causing an excessive blood supply, bad shoeing, careless paring of the feet by removing the sole support, as well as high-heel calkings without corresponding toe pieces, must be included under this head.

EXCITING CAUSES. These are many and varied, the most common are rapid changes of temperature, over exertion, exhaustion, ingestion of various foods, purgatives, and metastasis.

I. RAPID CHANGE OF TEMPERATURE. This acts as an exciting cause of laminitis in precisely the same way as they act to produce disease in other tissues, the result of these variations of temperature showing itself upon those parts which are particularly liable to the changes from some loss of their natural disease-resisting powers.

This change of temperature may be induced by drinking large quantities of cold water while in an overheated condition. Here the internal heat is rapidly reduced, the neighboring tissues and blood-vessels constrained, and the blood supply to these organs greatly diminished, while the quantity sent to the surface is correspondingly increased. In many of the cases which result from this cause there has not been sufficient labor performed to impair the powers of the laminae, yet it seems that laminitis is more readily induced than congestion or inflammation of the skin or other surface organs because of the impossibility upon the part of the laminae to relieve themselves of the threatened congestion by the general safety-

valve of perspiration. A cold wind or relatively cold air allowed to play upon the body when heated and wet with sweat has virtually the same result, for it arrests evaporation and rapidly cools the external surface, thereby determining an excess of blood to such organs and tissues as are protected from this outside influence. In many instances this happens to be some of the internal organs, as the lungs, where the previous work has been rapid and their activity impaired; but in numerous other instances the blood is forced toward the feet, and that it so depends upon two facts; first, that these tissues have been greatly excited and are already receiving as much blood as they can accommodate consistently with health; secondly, even though these tissues are classed with those of the surface, their protection from outside influence by means of the thick box of horn around them renders them in this respect equivalent to internal organs.

Again, a limited local action of cold excites this disease, as seen from driving through water or washing the feet or legs while the animal is warm or just in from work. Here a very marked reaction takes place in the surface tissues of the limbs, and passive congestion of the foot results from an interference with the return flow of blood, which is being sent to these organs in excess. These are more apt to be simple cases of congestion, soon to recover, yet they may become true cases of laminitis.

2. OVER-EXERTION. Heavy pulling or rapid work, even when there is no change for immoderate concussion, occasionally results in this disease, although in the majority of instances exhaustion is a conjunctive cause, for over-exertion can not be long continued without inducing exhaustion.

3. EXHAUSTION. However produced, this is nearly as prolific a source of laminitis as is concussion, for when the physical strength has been greatly impaired, even though but temporarily, some part of the economy is rendered more vulnerable to disease than others, and it is not strange that in many instances it should be those parts still called upon to perform their function of maintaining the weight of the body and their activity has been exhausted. It is to this cause we must ascribe those many cases which we see following a hard day's work, where at no time has there been over-exertion or immoderate concussion.

The same cause exists where one foot has been blistered, or where one limb is incapacitated from any other reason; for the opposite member

being called on to do double duty, soon becomes exhausted, and congestion followed by inflammation, results as a matter of course. Where one foot only becomes laminitic, it is customary to find the other or corresponding member participating at a later date, not always because of sympathy, but because the transfer of all the functional performance to the one foot proves within itself a sufficient exciting cause.

4. **INGESTION OF VARIOUS FOODS.** Why it is that certain kinds of grain will cause laminitis does not seem to be clearly understood. Certainly they possess no specific action upon the laminæ, for all animals are not alike affected, neither do they always produce these results in the same animal. In the case of some of these ailments, where their ingestion causes a strong tendency to indigestion, the consequent irritation of the alimentary canal may be so great as to warrant the belief that the laminæ are affected through sympathy. In other instances there is no apparent interference with digestion, nor evidence of any irritation of the mucous membrane, yet the disease is in some manner dependent upon the food in question for its inception. Barley, wheat, and sometimes corn are the grains most prolific in the production of this disease. With some horses there appears to be a particular susceptibility to the influence of corn. In such instances the feeding of this grain for a few days will be followed by inflammation of the feet, lasting from a few days' to two weeks' time. In these animals, to all appearances healthy, the corn neither induces colic, indigestion, nor purging, and apparently no irritation whatever of the alimentary canal.

5. **PURGATIVES.** Fortunately purgative medicines but rarely become the exciting cause of inflammation of the laminæ. That it is then the result of a sympathetic action upon the part of the tissues affected is no doubt more than hypothetical, for when there is no derangement of the alimentary canal existing a dose of cathartic medicines will at times bring on severe laminitis; and that, too, before purgation commences.

6. **METASTASIS.** Most if not all the older authorities were agreed that metastatic laminitis is a reality. That such a condition ever does exist outside the imagination certainly awaits the proving. That laminitis may and oftentimes does exist as a concurrent disease with numerous others is unquestionably true, but to believe an inflammation can be almost momentarily transferred from organ to another, no matter how remote, is to destroy all belief in our knowledge of the pathology of this complicated process. It is possible that the induction of laminitis, during the course of some other disease, may serve to arrest the further in-

vasion of healthy tissue by the primary process, or that it may exert a remedial influence upon the first disease, but it can not and does not at once remove that inflammation and obliterate its lesions, for the products of any inflammation, however simple, require a certain time for their removal, and it is impossible that the products of inflamed lung tissue can be immediately removed and the inflammation in whole transferred to the laminæ. Metastatic laminitis, then, is nothing more nor less than concurrent laminitis, and as such presents little if any peculiarity outside the imperfectly understood exciting cause, and the practitioner who allows the acute symptoms of the laminitis to mislead him, simply because their severity has overshadowed those of the primary disease, may lose his case through unguarded subsequent treatment. This form of laminitis is by no means commonly met with, but when seen will usually be found in conjunction with pneumonia, according to Youatt with inflammation of the bowels and eyes, and according to Law and Williams sometimes with bronchitis.

7. **CONCUSSION.** This acts as a producer of this disease by the local overstimulation which it occasions, the excessive excitement being followed by an almost complete exhaustion of the functional activity of the laminated tissues, the exhaustion by congestion, and eventually by inflammation. But congestion here, as in all other tissues, is not necessarily followed by inflammation; for although the principal symptoms belonging to true laminitis are present, the congestion may be relieved before the processes of inflammation are fully established. This is the condition that obtains in the many so-called cases of laminitis, which recover in from twenty-four to forty-eight hours' time. These are the cases which should be called congestion of the laminæ.

Prevention. To guard against and prevent disease, or to render an attack less serious than it otherwise would be, is the highest practice of the healing art. In a disease so liable to result from the simplest causes as laminitis, and especially when the best judgment may not be able to know the extent of the disease-resisting powers of the tissues which are liable to be affected, or of what shall constitute an over-excitement, it is not strange that horse owners find themselves in trouble from unintentional wrong-doing. If the disease was dependent upon specific causes, or if the stability of the tissues were of a fixed or more nearly determinate quality, some measures might be adopted that would prove generally preventive. But when we recall the fact that predisposing causes

are so prevalent and often cannot be remedied, that what is but general work in one instance may incite disease in another, that what is food to-day may to-morrow prove detrimental to health, and that necessary medical interference may cause a more serious trouble than that which was being treated, the troubles to overcome are plain. Yet there are some general rules to be observed that will in part serve to prevent the development of an unusual number of cases. In the first place all the predisposing causes named must be removed where possible, and when this is impossible unusual care must be taken not to bring into operation an exciting cause. Fat animals should, under no circumstances, have hard work, and if the weather is warm or the variation of temperature great they should have but slow, gentle labor until they become used to it, and the tissues hardened.

Green horses should always have moderate work for the same reason, and particularly when changed from the farm and dirt roads to city pavements. The increased jarring, changed conditions and artificial living, will be active causes of disease under such circumstances. Army horses just out of winter quarters, track horses with insufficient preparation, and farmers' horses put to work in the spring, are among the most susceptible classes, and must be protected by work that is easy and gradual. If long marches or drives can not be avoided then the load must be as light as possible and the animal must have frequent rests. This allows the laminae to regain their impaired activity and thus will withstand much more work without danger. And then it permits the driver to easily detect an oncoming attack; it thus prevents working after the disease begins and renders treatment much more effective by cutting the process short at the stage of congestion.

All animals when resting immediately after work should be protected from cold air or draughts. If placed in a stable that is warm and without draught no covering is necessary; if cold, or if there is a draught blankets should be used until the excitement and exhaustion of the labor performed have entirely passed away. It is still better that all animals coming in warm from work be "cooled off" by slow walking until the sweat has dried and the circulation and breathing returned to the normal. Animals stopped on the road even for a few moments should always be protected from rapid change of temperature by blankets. If it can be avoided horses that are working should never be driven or ridden through a stream or pool of water. Where necessary they should be cooled off before passing through, and then kept exercising until com-

pletely dried. The same rule is to be observed with regard to washing the legs in cold water when the animal is just in from work, for, although it is practiced extensively and usually without damaging results, it often proves the cause of a most acute attack of founder. Regarding shoeing as a predisposing cause, unusual changes in the manner of supplying the shoe should not be hastily made.

If a plane shoe has been worn, high heels or toes must not be substituted at once, but the change, if necessary, should gradually be made, so that the different tissues may adapt themselves to the change they are called upon to bear. If, on the other hand, such changes are imperative, as is sometimes the case, then the work must be reduced in quantity and quality that it can not excite the disease.

Experience alone will determine what animals are liable to suffer from this disease through the influence of the different foods. When an attack can with any certainty be ascribed to any particular food, it should always be withheld unless in the smallest quantities. Horses that have never been fed upon Indian corn should receive but a little at a time at first, and always mixed with bran, oats, or other food, until it is known that no danger exists. Corn is much more liable to cause laminitis in warm than in cold weather, and for this reason it should always be fed with care during spring and summer months.

When an animal is excessively lame in one foot the other or opposite member should have the shoe early removed and cold water frequently applied. At the same time the slings should be used if the subject remains standing. Horses should under no circumstances be overworked; to guard against this, previous work, nature of roads, state of weather, and various other influences must be carefully noted. Watering while warm is a very bad habit, and unless the animal is accustomed to it, it is apt to result in some disorder, oftentimes in laminitis.

Symptoms. Laminitis is characterized by a number of symptoms so well marked as scarcely to be misunderstood by the observer. They are nearly constant and only modified by the number of feet affected, the cause which has induced the disease, and the previous condition of the patient. They may be divided into general symptoms, which are shown in all cases of the disease, subject to variations and special symptoms, or those which serve to show which feet are affected and the complications which may arise.

GENERAL. Usually the first symptoms that would indicate the

disease is an interference with locomotion produced by congestion of the sensitive membrane. Occasionally the other symptoms are presented first. With the development of the lameness the pulse will be found quicker, full, hard, and striking the finger more strongly; the temperature soon rises several degrees above the normal, reaching sometimes 106° F., although it generally ranges between $102\frac{1}{2}^{\circ}$ and 105° F. The respirations are rapid and panting in character, the nostrils being widely dilated, and the mucous membranes highly colored. The facial expression is anxious and indicates the most acute pain, while the body is more or less covered with sweat. At first there may be a tendency to diarrhea, or it may appear later, particularly as the result of the medicines used. The urine is high colored, scant in quantity, and of increased specific gravity, owing to the water from the system being eliminated by the skin instead of the kidneys. The appetite is impaired and sometimes entirely lost, while the thirst is greatly increased. The affected feet are hot and dry to the touch. They are relieved as much as possible from bearing weight. Rapping them with a hammer or compelling the animal to stand upon one affected member causes intense pain, while the artery of the fetlock throbs beneath the finger.

SPECIAL. Liability to affection varies in different feet according to the exciting cause. Any one or more of the feet may become the subject of this disease, although it appears more often in the fore-feet than in the hind ones, a fact owing to the difference of function, i. e., that the fore-feet are the basis of the columns of support, receiving nearly all the body weight during progression and consequently most of the concussion, while the hind-feet at such times become simply the fulcrums of the levers of progression, and are almost exempt from concussion.

Treatment. In cases of simple passive congestion of the laminæ, the body should be warmly clothed and warm drinks given to draw the blood in increased quantity to these parts so as to direct it from the feet; at the same time the feet should be placed in warm water so as to increase the return flow of blood. In the course of half an hour the feet may be changed to cold water, which serves as a tonic to all the tissues, and kept there until recovery is completed. If the constitutional symptoms demand it, diuretics should be given. Half-ounce doses of saltpeter, three times a day in the water, answers the purpose. In cases of active congestion the warm water foot baths should be omitted and cold

ones substituted for the commencement. Subacute laminitis demands the same treatment with laxatives if there is constipation, and the addition of low-heeled shoes. The diuretics may need to be continued for some time and their frequency increased. Regarding acute Laminitis, what has been called the "American treatment" is so simple and withal so efficient that it is to be remarked other countries have not adopted it. Since the disease is a local one, unquestionably the remedies used should be applied in the immediate neighborhood of the affected parts, or if drugs are administered internally, they should have some specific localized action. And such are the claims made for the above-named method of treatment. It consists solely in the exhibition of large doses of nitrate of potash and the continued application to the feet and ankles of cold water.

Three to four ounces of saltpeter in a pint of water, repeated every six hours, is the proper dose, and the laminitis frequently subsides inside of a week's time. These large doses may be continued for a week without danger; never under any circumstances will the kidneys be irritated to excess or other unfavorable effects be produced.

The feet should either be kept in a tub of water at a temperature of 35° to 50° F. (it may be lowered if desired), or if the animal is lying down swabs should be used and wet every half hour with the cold water. The water not only keeps the horn soft and moist, but acts directly upon the inflamed tissues by reducing their temperature, thereby increasing their vitality and disease-resisting qualities, and at the same time by toning up the coats of the blood vessels diminishes the supply of blood and limits the exudation. Furthermore, cold has also an anesthetic effect upon the diseased tissues and relieves the pain.

Aconite may be given in conjunction with niter where the heart is greatly excited and beating strongly. Ten-drop doses repeated every two hours for twenty-four hours is sufficient. The practice of giving cathartics is dangerous, for it may excite superpurgation. Usually the niter has sufficient effect upon the constipation to relieve it, yet if it should prove obstinate laxatives may be carefully given. Bleeding, both general and local, should be guarded against. The shoes should always be early removed and the soles left unpared.

Paring of the soles presents two objections. First, while it may temporarily relieve the pain by relieving pressure, it at the same time

allows of greater exudation, which may more than counterbalance the good effects. Secondly, it makes the feet tender and subject to bruises when the animal again goes to work. The shoes should be replaced when convalescence sets in and the animal is ready to take exercise. Exercise should never be enforced until the inflammation has subsided, for although it temporarily relieves the pain and soreness, it serves to maintain continued irritation, increases the exudation, and prolongs the recovery.

If, at the end of the fifth or sixth day, prominent symptoms of recovery are not apparent, apply a stiff blister of cantharides around the coronet and omit the niter for about forty-eight hours. As soon as the blister has drawn well the feet may again receive wet swabs. If one blister does not suffice to remove the soreness, as is the case sometimes, especially where periostitis is present, it may be repeated, or the actual cautery applied. The same treatment should be adopted where side bones form or inflammation of the coronet bone ensues. When the sole breaks through and exposes the coffin bone and soft tissues, the feet must be carefully shod with thin heels and thick toes where there is any tendency to walking on the heels, and the sole well protected with appropriate dressing and pressure over the exposed parts. When there is turning up of the toe, blistering of the coronet in front, carefully avoiding the quarters and heels, sometimes stimulates the growth of horn, but as a rule judicious shoeing is the only treatment that will keep the animal in a condition to do light, slow work.

Where suppuration of the laminæ is profuse it is better to destroy your patient at once and relieve his suffering, but if the suppuration is limited to a small extent of tissue, especially of the sole, treatment as in acute cases may induce recovery and should always be tried. If from bed-sores or other causes septicæmia or pyæmia is feared, the bisulphite of soda in half-ounce doses may be given in conjunction with tonics and other treatment indicated in these diseases. Regarding enforced encumbrance the propriety of insisting upon it in the majority of cases is doubtful because as a rule the animal assumes whatever position gives comfort. There can be no doubt that recumbency diminishes the amount of blood sent to the feet, and that the suffering is greatly relieved while in this position, so that the experiment of forcing the patient to lie down may be tried, yet should not be renewed if it thereafter persists in standing.

Where the animal stands, or where constant lying indicates it, to prevent extensive sores, the patient should be placed in slings, and the weight supported in this manner to the relief of the feet. When all four feet are affected it may be impossible to use slings, for the reason that the patient refuses to support any of his weight on his feet and simply hangs in them. Lastly, convalescent cases must not be returned to work too early, else permanent recovery may never be effected.

Peditis. This is the term which Williams applies to that serious complication of laminitis where not only the laminæ but the periosteum and the coffin bone are also the subjects of the inflammatory process. Neither is this all, for in some of these cases of peditis acute inflammation of the "coffin joint" is present, and occasionally suppuration of the joint. A mild form of periostitis, in which the exudation is in the outer or looser layer of the periosteum only, is a more common condition than is recognized by practitioners generally, and the intimate contiguity of structures is the predisposing cause, the disease either spreading from the original seat, or the complication occurs as one of the primary results of the exciting cause. In the severer cases where the exudate separates the periosteum from the bone, suppuration, gangrene, and superficial caries are common results; where infiltration of the bone tissues is rapid the blood supply is cut off by the pressure upon the vessels and death of the coffin bone ensues. Grave constitutional symptoms mark these changes and soon prove fatal.

In the mild cases of periostitis it is by no means easy to determine its presence positively, for there are no special symptoms by which it may be distinguished from pure laminitis. In the majority of the acute cases, though, which show no signs of improvement by the fifth to seventh day, it is safe to suspect that periostitis is present, particularly if the coronets are very hot, the pulse remaining full and hard, and the lameness acute. In the fortunately rare cases where the bone is affected with inflammation and suppuration, the agony of the patient is intense; he occupies the recumbent position almost continually, never standing for more than a few minutes at a time, suffers from the most careful handling of the affected feet; maintains a rapid pulse and respiration, high temperature, loss of appetite and great thirst. It is in these cases the patient continually grows worse, and the appearance of suppuration at the top of the hoof in about two weeks after the inception of the dis-

ease proves the inefficiency of any treatment that may have been adopted and the hopelessness of the case. These patients die usually between the tenth and twentieth days, either from exhaustion or pyæmic infections.

Sand-crack. A longitudinal (up and down) division in the fibers of the wall of the hoof, is called a sand-crack. It is usually found either on the inside in the fore-feet when it is called a quarter-crack, or in front in the hind-feet when it is usually named toe-crack.

The toe-crack is most likely to be complete (that is extending from the coronary band to the toe), while the quarter-crack is nearly always incomplete, at least when of comparatively recent origin. Sand-cracks are most serious when they involve the coronary band in the injury. They may be complicated at any time by bleeding, inflammation of the laminæ, suppuration, gangrene of the lateral cartilage and of the extensor tendon, caries of the coffin bone, or the growth of a horny tumor known as a keraphyllocele.

Causes. Relative dryness of the horn is the principal predisposing cause of sand-cracks. Excessive dryness is perhaps not a more prolific cause of cracks in the horn than alternate changes from damp to dry. It is claimed that these injuries are more common in mountainous countries. Animals used to running at pasture when changed to hard, dry floors are more liable, especially to toe-cracks, than those accustomed to stables. Small feet, with thick, hard hoofs, and feet which are excessively large, are oftener affected with sand-cracks than those of better proportion. A predisposition to quarter-crack exists in contracted feet, and in those where the toe turns out or the inside quarter turns under.

Heavy shoes, large nails, and nails set too far back toward the heels, together with such diseases as canker, quittor, grease and suppurative corns must be included as occasional predisposing causes of sand-cracks.

Fast work on hard roads, jumping, and blows on the coronet, together with calk wounds of the feet, are accidental causes of quarter cracks in particular. Toe-cracks are more likely to be caused by heavy pulling on slippery roads and pavements or on steep hills.

Symptoms. The fissure in the horn is oftentimes the only evidence of the disease; and even this may be accidentally or purposely hidden from casual view by mud, ointments, tar, wax, putty, gutta-percha, or by the long hairs of the coronet.

Sand-cracks sometimes commence on the internal face of the wall, involving its whole thickness, excepting a thin layer on the outer surface. In those cases the existence of the injury may be suspected from a slight depression, which begins near the coronary band and follows the direction of the horny fibers, but the trouble can only be positively diagnosed by paring away the outside layers of horn until the fissure is exposed. In toe-cracks the walls of the fissure are in close apposition when the foot receives the weight of the body, but when the foot is raised from the ground the fissure opens. In quarter-crack the opposite is true, and the fissure closes when the weight is removed from the foot. As a rule sand-cracks begin at the coronary band, and as they become older they not only extend downward, but they also grow deeper. In old cases, particularly in toe-crack, the horn on the borders of the fissures loses its vitality and scales off, sometimes through the greater part of its thickness, leaving behind a rough and irregular channel extending from the coronet to the end of the toe.

In many cases of quarter-crack, and in some cases of toe-crack as well, if the edges remain close together, with but little motion, the fissure is dry, but in other cases a thin, offensive discharge issues from the crack and the ulcerated soft tissues, or a fungus-like growth, protrude from the narrow opening.

When the cracks are deep and the motion of their edges considerable, so that the soft tissues are bruised and pinched with every movement, a constant inflammation of the parts is maintained and the lameness is severe.

Ordinarily, the lameness of sand-crack is slight when the patient walks; but it is greatly aggravated when he is made to trot, and the harder the road the worse he limps. Furthermore, the lameness is greater going down hill than up, for the reason that these conditions are favorable to an increased motion in the edges of the fissure.

Treatment. In so far as preventive measures are concerned but little can be done. The suppleness of the horn is, of course, to be maintained by the use of ointments, damp floor, bedding, etc. The shoe is to be proportioned to the weight and work of the animal; the nails holding it in place are to be of proper size and not driven too near the heels; sufficient calks and toe-pieces must be added to the shoes of horses working on slippery roads, and the evils of jumping, fast driving, etc., are to be avoided.

When a fissure has made its appearance, means are to be adopted which will prevent it from growing longer or deeper; and this can only be done by arresting all motion in the edges. The best and simplest artificial appliance for holding the borders of a toe-crack together is the Vachette clasp. These clasps, and the instruments necessary for their application, can be had of any of the more prominent makers of veterinary instruments. These instruments comprise a cautery iron with which two notches are burned in the wall, one on each side of the crack, and forceps with which the clasps are closed into place in the bottom of the notches and the edges of the fissure brought close together. The clasps being made of stiff steel wire are strong enough to prevent all motion in the borders of the crack. Before these clasps are applied the fissure should be thoroughly cleansed and dried, and, if the injury is of recent origin, the crack may be filled with a putty made of two parts of gutta percha and one part of gum ammoniac. The number of clasps to be used is to be determined by the length of the crack, the amount of motion to be arrested, etc. Generally the clasps are from one-half to three-quarters of an inch apart. The clasps answer equally as well in quarter-crack if the wall is sufficiently thick and not too dry and brittle to withstand the strain.

In the absence of these instruments and clasps a hole may be drilled through the horn across the fissure, and the crack closed with a thin nail made of tough iron, neatly clinched at both ends. A plate of steel or brass is sometimes fitted to the parts and fastened on with short screws; while this appliance may prevent much gaping of the fissure, it does not entirely arrest motion of the edges for the simple reason that the plate and screw cannot be rendered immobile.

In all cases of sand-crack the growth of horn should be stimulated by blistering the coronary band. In simple quarter-crack recovery will often take place if the coronet is blistered, the foot shod with a "tip," and the patient turned to pasture.

The shoe, in toe-crack, should have a clip on each side of the fissure and should be thicker at the toe than at the heels. The foot should be lowered at the heels by paring, and spared at the toe, except directly under the fissure where it is to be pared away until it sets free from the shoe.

Navicular Disease. Navicular disease, often called "navicular arthritis" by the English, is an inflammation of the sesamoid sheath, induced by repeated bruising or laceration, and complicated in many cases

by inflammation and caries of the navicular bone. In some instances the disease undoubtedly begins in the bone, and the sesamoid sheath becomes involved subsequently by an extension of the inflammatory process.

The thoroughbred horse is more commonly affected with the disease than any other, yet no class or breed of horses is entirely exempt. The mule, however, seems rarely, if ever, to suffer from it. For reasons which will appear when considering the causes of the disease the hind feet are not liable to be affected. As a general rule but one fore-foot suffers from the disease, but if both should be attacked the trouble has become chronic in the first before the second shows signs of the disease.

Causes. To understand fully how navicular disease may be caused by conditions and usages common to nearly all animals, it is necessary to recall the peculiar anatomy of the parts involved in the process and the functions which they perform in locomotion. It must be remembered that the fore-legs largely support the weight of the body when the animal is at rest, and that the faster he moves the greater is the shock which the fore-feet must sustain as the body is thrown forward upon them by the propelling force of the hind-legs. This shock could not be withstood by the tissues of the fore-feet and legs were it not that it is largely dissipated by the elastic muscles which bind the shoulder to the body, the ease with which the arm closes on the shoulder blade, and the spring of the fetlock joint.

But even these means are not sufficient within themselves to protect the foot from injury, and so nature has further supplemented them by placing the coffin joint on the hind part of the coffin bone instead of directly on top of it, whereby a large part of the shock of locomotion is dispersed before it can reach the vertical column, represented in the cannon, knee and arm bones. A still further provision is made by placing a soft, elastic pad (the frog and plantar cushion) at the heels to receive the sesamoid expansion of the flexor tendon as it is forced downward by the pressure of the coronet bone against the navicular. Extraordinary as these means may appear for the destruction of shock, and ample as they are when the animal is at a slow pace or unweighted by rider or load, they fail to completely relieve the parts from concussion and excessive pressure whenever the opposite conditions are present.

The result, then, is that the coronet bone forces the navicular hard against the flexor tendon, which, in turn, presses firmly against the na-

vicular as the force of the contracting muscles lifts the tendon into place. It is self-evident, then, that the more rapid the pace and the greater the load, the greater must these contending forces be, and the greater the liability to injury. For the same reason horses with excessive knee action are more likely to suffer from this disease than others, concussion of the foot and intense pressure on the tendon being common attendants upon their usage.

Besides these exciting causes must be considered those which predispose to the disease. Most prominent among these is heredity. It may be claimed, however, that an inherited predisposition to navicular disease consists not so much in a special susceptibility of the tissues which are involved in the process as in a vice of conformation which, as is well known, is likely to be transmitted from parent to offspring. The faults of conformation most likely to be followed by the development of navicular disease are an insufficient plantar cushion, a small frog, high heels, excessive knee action, and contracted heels. Finally, the environments of domestication and use, such as dry stables, heavy pulling, bad shoeing, punctured wounds, etc., all have their influence in developing this disease.

Symptoms. In the early stages of navicular disease the symptoms are generally very obscure. When the disease begins in inflammation of the navicular bone the animal points the affected foot while at rest, a time before any lameness is seen. While at work he apparently travels as well as ever, but when placed in the stable one foot is set out in front of the other, resting on the toe, with fetlock and knee fixed. After a time, if the case is closely watched, the animal takes a few lame steps while at work, but the lameness disappears as suddenly as it came and the driver doubts if the animal was really lame at all. Later on the patient has a lame spell which may last during a greater part of the day, but the next morning it is gone; he leaves the stable all right, but goes lame again during the day. In time he has a severe attack of lameness, which may last for a week or more, when a remission takes place and it may be weeks or months before another attack supervenes. Finally, he becomes constantly lame, and the more he is used the greater the lameness.

In the lameness from navicular disease the affected leg always takes a short step, and the toe of the foot first strikes the ground, so that the shoe is most worn at this point. If the patient is made to move backwards the foot is set down with exceeding great care, and the weight

rests upon the affected leg but a moment. When exercised he often stumbles, and if the road is rough he may fall on his knees. If he is lame in both feet the gait is stilty, the shoulders seem stiff, and if the patient is made to work he sweats profusely from the intense pain. Early in the development of the disease a careful examination will reveal some increased heat in the heels and frog, particularly after work; as the disease progresses this becomes more marked until the whole foot is hot to the touch. At the same time there is an increased sensibility of the foot, for the patient flinches from the concussion of a hammer lightly applied to the frog and heels, or from the pressure of the smith's pincers. The frog is generally shrunk, often of a pale reddish color, and at times it is affected with thrush. If the heels are pared away so that all the weight is received on the frog, or if the same result is attained by the application of a bar shoe, the animal is excessively lame. The muscles of the leg and shoulder shrink away, and often tremble as the animal stands at rest. After months of lameness the foot is found to be shrunk in its diameter and apparently lengthened; the horn is dry and brittle and has lost its natural gloss, while circular ridges, developed most toward the heels, cover the upper part of the hoof. When both feet are affected the animal points first one foot then the other, and stands with the hind-feet well forward beneath the body so as to relieve the fore-feet as much as possible from bearing weight. In old cases the wasting of the muscles and the knuckling at the fetlock become so great that the leg can not be straightened, and locomotion can scarcely be performed. The disease generally makes a steady progress without inclining to recovery—the remission of symptoms in the earlier stages should not be interpreted as evidence that the process has terminated. The complications usually seen are ringbones, side-bones, thrush, contracted heels, quarter-cracks, and fractures of the navicular, coronet, and pastern bones.

Treatment. But a few cases of navicular disease recover. In the early stages the wall of the heels should be rasped away as directed in the treatment for contracted heels, until the horn is quite thin; the coronet should be well blistered with Spanish-fly ointment, and the patient turned to grass in a damp field or meadow. After three or four weeks' time the blister should be repeated. This treatment is to be continued for two or three months. Plane shoes are to be put on when the patient is returned to work. In chronic cases the animal should be put to slow, easy work. To relieve the pain, neurotomy may be performed—

an operation in which the sense of feeling is destroyed in the foot by cutting out pieces of the nerve at the fetlock. This operation in nowise cures the disease, and since it may be attended with serious results can only be advised in certain favorable cases, to be determined by the veterinarian.

Quittor. This is a term applied to various affections of the foot wherein the tissues which are involved undergo a process of degeneration that results in the formation of a slough, followed by the elimination of the diseased structures by means of a more or less extensive supuration.

Causes. Bruises and other wounds of the coronet are often the cause of cutaneous quittor, yet there can be no question but that in the great majority of these cases the disease develops without any known cause. For some reason, not yet satisfactorily explained, most cases happen in the fall of the year. One explanation of this fact has been attempted in the statement that the disease is due to the injurious action of cold and mud. This claim, however, seems to lose force when it is remembered that in many parts of this country the most mud, accompanied by freezing and thawing weather, is seen in the early spring-time without a corresponding increase of quittor. Furthermore, the very serious outbreaks of this disease in the mountainous regions of Colorado, Wyoming, and Montana, are seen in the fall and winter seasons, when the weather is the driest. It may be claimed, and perhaps with justice, that during these seasons when the water is low, animals are compelled to wade through more mud to drink from lakes and pools than is necessary at other seasons of the year, when these lakes and pools are full. Add to these conditions the further fact that much of this mud is impregnated with alkaline salts, which, like the mineral substances always found in the mud of cities, are more or less irritating, and it seems fair to conclude that under certain circumstances mud may become an important factor in the production of quittor.

Symptoms. Lameness, lasting from one to three or four days, nearly always precedes the development of the strictly local evidences of quittor. The next sign is the appearance of a small, tense, hot, and painful tumor in the skin of the coronary region. If the skin of the affected foot is white the inflamed portion will present a dark red or even a purplish appearance near the center. Within a few hours' time the ankle, or even the whole leg as high as the knee or hock, becomes much swollen. The lameness is now so great that the patient refuses to use the foot at all,

but carries it in the air if compelled to move. As a consequence the opposite leg is required to do the work of both, and if the animal persists in standing a greater part of the time it, too, becomes swollen. In many of these cases the suffering is so intense during the first few days as to cause general fever, dullness, loss of appetite, and increased thirst. Generally the tumor shows signs of suppuration within forty-eight to seventy-two hours after its first appearance; the summit softens, a fluctuating fluid is felt beneath the skin, which soon ulcerates completely through, causing the discharge of a thick, yellow, bloody pus, containing shreds of dead tissue which have sloughed away. The sore is now converted into an open ulcer, generally deep, nearly or quite circular in outline, and with hardened base and edges. In exceptional cases large patches of skin, varying from one to two and one-half inches in diameter, slough away at once, leaving an ugly superficial ulcer. These sores, especially when deep, suppurate freely; if there are no complications **they tend to heal** rapidly as soon as the degenerated tissue has softened and is entirely removed. When suppuration is fully established the lameness and general symptoms subside. Where but a single tumor and abscess form, the disease progresses rapidly and recovery, under proper treatment; may be effected in from two to three weeks' time; but when two or more tumors are developed at once or where the formation of one tumor is rapidly succeeded by another for an indefinite time, the sufferings of the patient are greatly increased, the case is more difficult to treat, and recovery is more slow and less certain.

Treatment. The first step in the treatment of an outbreak of quittor should be the removal of all exciting causes.

Watering places, accessible without having to wade through mud, are to be supplied. Carefully cleanse the feet and legs as soon as the animal returns from work. Warm water should be used to remove the mud and dirt, after which the parts are to be thoroughly dried with soft cloths.

The means which are to be adopted for the cure of cutaneous quittor vary with the stage of the disease at the time the case is presented for treatment. If the case is seen early, that is, before any of the signs of suppuration have developed, the affected foot is to be placed under a constant stream of cold water, with the object of arresting a further extension of the inflammatory process. To accomplish this put the patient in slings in a narrow stall having a slat or open floor. Bandage the foot and leg to the knee or hock, as the case may be, with flannel

bandages loosely applied. Set a tub or barrel filled with cold water above the patient and by the use of a small rubber hose of sufficient length make a syphon which will carry the water from the bottom of the tub to the leg at the top of the bandages. The stream of water should be quite small, and it is to be continued until the inflammation has entirely subsided or until the presence of pus can be detected in the tumor. When suppuration has commenced the process should be aided by the use of warm baths and poultices of linseed meal or boiled turnips. If the tumor is of rapid growth, accompanied by intense pain, relief is secured and sloughing largely limited by a free incision of the parts. The incision should be vertical and deep into the tumor, care being taken not to entirely divide the coronary band. If the tumor is large more than one incision may be necessary.

The foot should now be placed in a warm bath for half an hour or longer and then poulticed. The bleeding produced by the cutting and encouraged by the warm bath is generally very copious and soon gives relief to the overtension of the parts.

In other cases it will be found that suppuration is well under way, so that the center of the tumor is soft when the patient is first presented for treatment. It is always good surgery to relieve pus whenever its presence can be detected; hence in these cases a free incision must be made into the softened parts, the pus let out and the foot poulticed.

By surgical interference the tumor is now converted into an open sore or ulcer, which, after it has been well cleaned by warm baths and poultices applied for two or three days, needs to be protected by proper dressings. The best of all protective dressings is made of small balls of pledgets of oakum, carefully packed into the wound and held in place by a roller bandage four yards long, from three to four inches wide, made of common bedticking and skillfully applied. The remedies which may be used to stimulate the healing process are many, and as a rule they are applied in the form of solution or tinctures.

The solution of bichloride of mercury one part, water five hundred parts, with a few drops of muriatic acid or a few grains of muriate of ammonia added to cause the mercury to dissolve. The balls of oakum are wet with this solution before they are applied to the wound.

Among other remedies which may be used, and perhaps with equally as good results, will be noted the sulphate of copper, iron, and zinc, five grains of either to the ounce of water; chloride of zinc, five grains to the

ounce; carbolic acid, twenty drops dissolved in an equal amount of glycerine and added to one ounce of water, and the nitrate of silver, ten grains to one ounce of water.

If the wound is slow to heal it will be found of advantage to change the remedies used every few days, for after a time a remedy seems to lose its stimulating effect upon the slow-growing granulations.

If the wound is pale in color, the granulations transparent and glistening, the tincture of aloes, tincture of gentian, or the spirits of camphor may do best.

When the sore is red in color and healing rapidly an ointment made of one part of carbolic acid to forty parts of cosmoline or vaseline is all that is needed.

If the granulations continue to grow until a tumor is formed, which projects beyond the surrounding skin, it should be cut off with a sharp, clean knife, the foot poulticed for twenty-four hours, after which the wound is to be well cauterized daily with lunar caustic and the bandages applied with great firmness.

The question as to how often the dressings should be renewed must be determined by the condition of the wound, etc. If the sore is suppurating freely it will be necessary to remove the dressing every twenty-four or forty-eight hours. If the discharge is small in quantity and the patient comfortable the dressing may be left on for several days; in fact, the less often the wound is disturbed the better, in so long as the healing process is healthy. When the sore commences to skin over the edges should be lightly touched with the lunar caustic at each dressing. The patient may be given a little exercise daily, but the bandages must be kept on until the wound is entirely healed.

Various Forms of Quittor. When not only the skin and subcutaneous tissues are involved but also the tendons of the leg, and the ligaments of the joints it is called **TENDINOUS QUITTOR**.

When the skin and subcutaneous tissues on some part of the coronet followed by a slough and the formation of an ulcer it is called a **CUTANEOUS QUITTOR**.

The most common form is called the **SUBHORNY QUITTOR**. It is generally seen in but one foot at a time, and more often in the fore-feet than in the hind ones. It nearly always attacks the inside quarter, but may affect the outside quarter, the toe, or the heel, where it is but of

little consequence. It consists in the inflammation of a small part of the coronary band and adjacent skin, followed by sloughing and more or less suppuration, which in most cases extends to the neighboring sensitive laminæ.

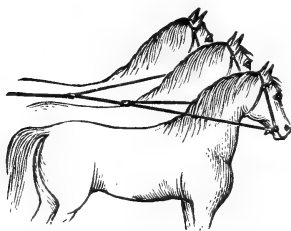
HOW TO DETECT THE SEAT OF LAMENESS.

In conducting an examination to detect the seat of lameness, the animal should be unblanketed, and held by a plain halter in the hands of a man who knows how to manage his paces, and preference should be given to a hard road for the trial. He is to be examined from various positions—from before, from behind, and from each side. Watching him as he approaches, as he recedes, and as he passes by, the observer should carefully study that important action, the DROPPING OF THE BODY upon one extremity or the other, and this can readily be detected by attending closely to the motions of the head and the hip. The head drops on the same side on which the mass of the body will fall, dropping towards the right when the lameness is in the left fore-leg, and the hip dropping in posterior lameness, also off the sound leg, the reverse of the conditions; of course, producing reversed effects. In other words, when the animal in trotting exhibits signs of irregularity of action, or lameness, and this irregularity is accompanied by dropping or nodding the head, or depressing the hip on the right side of the body, at the time the feet of the right side strike the ground, the horse is lame on the left side. If the dropping and nodding are on the near side the lameness is on the off side.

But in a majority of cases the answer to the first question relating to the lameness of a horse is, after all, not a very difficult task. There are two other problems in the case more difficult of solution and which often require the exercise of a closer scrutiny, and draw upon all the resources to settle satisfactorily. That a horse is lame in a given leg may be easily determined, but when it becomes necessary to pronounce upon the query as to what part, what region, what structure, is affected, the easy part of the task is over, and the more difficult and important, because more obscure portion of the investigation has commenced, except, of course, in cases of which the features are too distinctly evident to the senses to admit of error. It is true that by carefully noting the manner in which a lame leg is performing its functions, and closely watching the motions of the whole extremity, and especially of the various joints which enter into structure; by minutely examining every part of the

limb; by observing the outlines; by testing the change, if any, in temperature and the state of the sensibility, one may be guided to a correct localization of the seat of trouble, but one must carefully refrain from the adoption of a hasty conclusion, and above all, assure himself that he has not failed to make the foot, of all the organs of the horse the most liable to injury and lesion, the subject of the most thorough and minute examination of all the parts which compose the suffering extremity.

The greater liability of the foot than of any other part of the extremities to injury from casualties, natural to its situation and use, should always suggest the beginning of an inquiry, especially in an obscure lameness at that point. Indeed the lameness may have an apparent location elsewhere, when that is the true seat of the trouble, and the person who, while examining his lame patient, discovers a ringbone, and satisfying himself that he has encountered the cause of the disordered action suspends his investigation without subjecting the foot to a closer scrutiny, may deeply regret his neglect at a later day, when regrets will avail nothing towards remedying the injury which has ensued upon his partial method of exploration. But, as in human experience, there are instances when disease will deliver their fatal messages, while leaving no mark and making no sign by which they might be identified and classified, so that it will happen that in the humbler animals the onset and progress of mysterious and unrecognizable ailments will at times baffle the best veterinarian skill, and leave our burden-bearing servants to succumb to the inevitable, and suffer and perish in unrelieved distress.



CHAPTER XIV.

THE SKIN.

Its Diseases and How to Cure Them. Its Parasites and How to Destroy Them.

STRUCTURE OF THE SKIN, CRACKED HEELS OR SCRATCHES, NETTLE-RASH OR SURFEIT, HORNY SLOUGHS OR SITFASTS, WARTS, CONGESTION WITH PIMPLES, ANIMAL AND VEGETABLE PARASITES, FISTULA, ETC.

THE skin consists primarily of the superficial layer, the cuticle or epidermis without blood vessels; and the deep layer, the corium, dermis or true skin, which has many blood vessels. The cuticle is made up of cells placed side by side and more or less modified in shape by mutual compression and by surface evaporation and drying. The outside layer consists of the cells dried in the form of scales, which fall off continually and form dandruff. The deeper layer is formed of somewhat rounded cells with large central nuclei, and in colored skin containing numerous pigment granules. These cells have prolongations or branches by which they communicate with each other and with the superficial layer of cells in the true skin beneath. Through these they receive nutrient liquids for their growth and increase, and through these liquids absorbed by the skin, may be passed on into the vessels of the true skin beneath.

The TRUE SKIN OR DERMIS has a framework of interlacing bundles of white and yellow fibers, large and coarse in the deeper layers, and fine in the superficial where they approach the cuticle. Between the fibrous bundles are left interspaces which, like the bundles, become finer as they approach the surface, and inclose cells, vessels, nerves, glands, gland ducts, hairs, and in the deeper layers fat.

The superficial layer of the dermis is formed into a series of minute conical elevations or papilla, projecting into the deep portion of the cuticle, from which they are separated by a very fine transparent membrane. This papillary layer is very richly supplied with capillary blood vessels and nerves, and is at once the seat of acute sensation and the point from which the nutrient liquid is supplied to the cells of the cuticle above. It is also at this point that the active changes of inflammation are especially concentrated.

The HAIRS are cuticular products growing from an enlarged papilla lodged in the depth of a sack, hollowed out in the skin and extending to the deepest layers. The hair follicle is lined by cells of epidermis, which at the bottom are reflected on the papilla and become the root of the hair. The hair itself is formed of the same kind of cells firmly adherent to each other by a tough substance, and overlapping each other like slates on a roof in a direction towards the free end.

The SEBACEOUS (OIL) GLANDS are branching tubes ending in follicles or sacks and opening into the hair follicles, lined by a very vascular fibrous net-work representing the dermis, and an internal layer of cells representing the mucous layer of the cuticle. Their oily secretion gives gloss to the hair and prevents its becoming dry and brittle, and keeps the skin soft and supple, protecting it at once against undue exhalation of water and undue absorption when immersed in that medium. Besides those connected with the hair follicles there are numerous isolated sebaceous glands, opening directly on the surface of the skin, producing a somewhat thicker and more odorous secretion.

The SWEAT GLANDS of the horse, like those of man, are composed of simple tubes, which extend down through the cuticle and dermis in a spiral manner, and are coiled into balls in the deeper layer of the true skin. In addition to their importance in throwing offensive waste products out of the system, these glands tend to cool the skin and the entire economy of the animal through the evaporation of their watery secretion.

Cracked Heels or Scratches. This usually sets in with swelling, heat, and tenderness of the hollow of the heel, with erections of the hairs and redness (in white skins), with stiffness and lameness, which may be extreme in irritable horses. Soon slight cracks appear transversely, and may gain in depth and width, and may even suppurate. More frequently they become covered at the edges or throughout by

firm incrustations resulting from the drying of the liquids thrown out, and the skin becomes increasingly thick and rigid. A similar condition occurs behind the knee and in front of the hock (malanders and salanders), and may extend from these points to the hoof, virtually incasing that side of the limb in a permanent incrusting sheath. Besides a heavy lymphatic constitution, which predisposes to this affection, the causes are overfeeding on grain, altered unwholesome fodder, close, hot, dirty stables, constant contact with dung and urine and their emanations, working in deep, irritant mud; above all, in limestone districts, irritation by dry limestone or sandy dust in dry weather on dirt road, also cold draughts, snow and freezing mud, washing the legs with caustic soap, wrapping the wet legs in thick woollen bandages which soak the skin and render it sensitive when exposed next day, clipping the heels, weak heart and circulation, natural or supervening on overwork, imperfect nourishment, impure air, lack of sunshine, chronic, exhausting, or debilitating diseases, or functional or structural diseases of the heart, liver or kidneys. These last induce dropsical swelling of the limbs (stocking), weaken the parts, and induce cracking. Finally the cicatrix of a pre-existing crack, weak, rigid, and unyielding, is liable to reopen under any severe exertion, hence rapid paces and heavy draft are active causes.

In treatment the first step is to ascertain and remove the cause whenever possible. If there is much local heat and inflammation a laxative (five drams aloes, or one pound Glauber salts) may be given, and for the pampered animal the grain should be reduced or replaced altogether by bran mashes, flaxseed, and other laxative, non-stimulating food. In the debilitated, on the other hand, nutritious food and bitter tonics may be given, and even a course of arsenic (five grains arsenic with one dram bicarbonate of soda daily.) When the legs swell exercise on dry roads, hand-rubbing, and evenly applied bandages are good, and mild astringents, like extract of witch-hazel may be applied and the part subsequently rubbed dry and bandaged. If there is much heat but unbroken skin, a lotion of two drams of sugar of lead to one quart of water may be applied on a thin bandage, covered in cold weather with a dry one. The same may be used after the cracks appear, or a solution of sulphurous acid solution one part, glycerine one part, and water one part, applied on cotton and well covered by a bandage. In case these should prove unsuitable to the particular case, the part may be smeared with vaseline one ounce, sugar of lead one dram, and carbolic acid ten drops.

Nettlerash, Surfeit or Urticaria. This is an eruption in the form of cutaneous nodules, in size from a hazel nut to a hickory nut, transient, with little disposition to the formation of either blister or pustule, and usually connected with shedding of the coat, sudden changes of weather, and unwholesomeness or sudden change in the food. It is most frequent in the spring and in young and vigorous animals (good feeders). The swelling embraces the entire thickness of the skin and terminates by an abrupt margin in place of shading off into surrounding parts. When the individual swellings run together there are formed extensive patches of thickened integument. These may appear on any part of the body, and may be general; the eyelids may be closed, the lips rendered immovable, or the nostrils so thickened that breathing becomes difficult and snuffing. It may be attended by constipation or diarrhea, or by colicky pains. The eruption is sudden, the whole skin being sometimes covered in a few hours, and it may disappear with equal rapidity or persist for six or eight days.

Treatment. This consists in clearing out the bowels by five drams Barbadoes aloes, or one pound Glauber's salts, and follow the operation of these by daily doses of one-half ounce powdered gentian and one ounce Glauber's salts. A weak solution of alum may be applied to the swellings.

Horny Sloughs or Sitfasts. These are circumscribed sloughs of limited portions of the skin, the result of pressure by badly-fitting harness, or by irritating masses of dirt, sweat, and hairs under the harness. They are most common under the saddle, but may be found under collar or breeching as well. The sitfast is a piece of dead tissue which would be thrown off but that it has formed firm connections with the fibrous skin beneath, or even deeper with the fibrous layers (fascia) of the muscles, or with the bones, and is thus bound in its place as a persistent source of irritation. The horn-like slough may thus involve the superficial part of the skin only, or the whole thickness of the skin, and even of more of the structures beneath. The first object is to remove the dead irritant by dissecting it off with a sharp knife, after which the sore may be treated with simple wet cloths or a weak carbolic acid lotion, like a common wound. If the outline of the dead mass is too indefinite, a linseed-meal poultice will make its outline more evident to the operator. If the fascia or bone has become gangrenous the dead portion must be removed with the horn-like skin. During and after treatment the horse must be kept at rest or the harness must be so adjusted that no pressure can come near the affected parts.

Warts. These are essentially a morbid outgrowth of the superficial papillary layer of the skin and of the investing cuticular layer. They are mostly seen in young horses, about the lips, eyelids, cheeks, ears, beneath the belly, and on the sheath, but may develop anywhere. The smaller ones may be clipped off with scissors and the raw surface cauterized with bluestone. The larger may be sliced off with a sharp knife, or if with a narrow neck they may be twisted off and then cauterized. If very vascular they may be strangled by a waxed thread or cord tied around the neck, at least three turns being made round and the ends being fixed by passing them beneath the last preceding turn of the cord, so that they can be tightened day by day as they slacken by shrinkage of the tissues. If the neck is too broad it may be trans-fixed several times with a double-threaded needle and then be tied in sections. Very broad warts that cannot be treated in this way may be burned down to beneath the surface of the skin with a soldering bolt at a red heat and any subsequent tendency to overgrowth kept down by bluestone.

Congestion, with Small Pimples or Papules. In this affection there is the general blush, heat, etc., of erythema, together with a crop of elevations from the size of a poppy-seed to a coffee-bean, visible when the hair is reversed or to be felt with the finger where the hair is scanty. In white skins they vary from the palest to the darkest red. All do not retain the popular type, but some go on to form blisters (eczema, bullæ), or pustules, or dry up into scales, or break out into open sores, or extend into larger swellings (tubercles). The majority, however, remaining as pimples, characterize the disease. When very itchy the rubbing breaks them open, and the resulting sores and scales hide the true nature of the eruption.

The general and local causes may be the same as for erythema, and in the same subject one portion of the skin may have simple congestion and another adjacent papules. As the inflammatory action is more pronounced, so the irritation and itching are usually greater, the animal rubbing and biting himself severely. This itching is especially severe in the forms which attack the roots of the mane and tail, and there the disease is often so persistent and troublesome that the horse is rendered virtually useless.

The bites of insects often produce a papular eruption, but in many such cases the swelling extends wider into a button-like elevation, one-half to an inch in diameter. The same remarks apply to the effects of the poison ivy and poison sumac.

In papular eruption first remove the cause, then apply the same general remedies as for simple congestion. In the more inveterate cases use a lotion of one-half ounce sulphide of potassium in two quarts water, to which a little Castile soap has been added. Or use a wash with one-half ounce oil of tar, two ounces Castile soap, and twenty ounces water.

ANIMAL PARASITES OF THE SKIN.

Mange or Ascariasis. This affection is due to the irritation of the skin, caused by the presence of a nearly microscopic acarus or mite. The disease varies, however, according to the species of acarus which infests the skin, so that we must treat of several different kinds of acariasis.

The parasite is *SARCOPTES EQUI*. The disease is called *SARCOPTIC ASCARIASIS*. This is the special sarcoptes of the horse, but under favorable conditions it can be transmitted to ass and mule, and even to man, and may live indefinitely on the human skin. The mite is nearly microscopical, but may be detected with a magnifying lens among moving scurf taken from the infected skin. Like all sarcoptes, it burrows little galleries in and beneath the scurf skin, where it hides and lays its eggs and where its young is hatched. It is therefore often difficult to find the parasite on the surface, unless the skin has been heated by a temporary exposure to the sun or in a warm room. Even then it may be needful to tie the scab on the human arm till a prickling is felt, when the acarus will be found in the center of a minute capule by its bite. Like other acari this is wonderfully prolific, a new generation of fifteen individuals being possible every fifteen days, so that in three months the offspring of a single pair may produce a generation of one million five hundred thousand. The sarcoptes have less vitality than the non-burrowing acari, as they die in an hour when kept in dry air apart from the skin at a heat of 145° F. They live twelve to fourteen days apart from the skin in the damp air of a stable. On a piece of damp hide they lived till the twenty-fourth day, but were dead on the twenty-eighth.

The symptoms are an incessant, intolerable, and increasing itching of some part of the skin (head, mane, tail, back, etc.), the horse inclining himself toward the hand that scratches him, and moving his lips as if himself scratching. The hairs may be broken and rubbed off, but the part is never entirely bald as in ring-worm, and there may be papules or

any kind of eruption or open sores from the energy of scratching. Scabs of any thickness may form, but the special features are the intense itching and the discovery of the acarus.

Treatment. This consists in the removal of scabs by soapsuds, and, if necessary, a brush, and the thorough application of tobacco one and one-half ounce and water two pints, prepared by boiling. This may be applied more than once, and should always be repeated after fifteen days, to destroy the new brood that may have been hatched in the interval. All harness and stable utensils should be similarly treated; blankets and rubbers may be boiled, and the stalls should be covered with a whitewash of quicklime, containing one-fourth pound of chloride of lime to the gallon.

Grubs in the Skin. This malady is caused by the GRUBS (*HYPODERMA SILENUS*), getting under the skin. This fly deposits its embryo on or in the skin of the horse, as the *Hypoderma bovis* does in the ox, and the resulting larvæ pass the winter in little rounded sacks beneath the integument, furnished with a central opening, through which the mature larva escapes in early summer and develops into a fly. In districts where they exist the grubs should be pressed out of the skin and destroyed in the course of the winter.

Grubs on the Skin, or Fly-Blow. The following flies, among others, deposit their eggs on open sores or on wet filthy parts of the skin, where their larvæ or grubs give rise to serious trouble: *Lucilia Cæsar* (blue bottle), *Lucilia hominivorax* (screw-worm fly), *Musca vomitoria* (meat-fly), and *Sarcophaga carnaria* (flesh-fly.) To prevent their attacks wet, filthy hair should be removed and wounds kept clean, and rendered antiseptic by a lotion of carbolic acid one part, water fifty parts; by a mixture of one ounce oil of tar in twenty ounces sweet oil, or some other antiseptic. If the grubs are already present they should be picked off and one of these dressings freely applied.

Flies. A number of flies attack horses and suck their blood, producing great annoyance, and in some instances death. These insects not only suck the blood, but also often instil an acid poison into the skin, and in exceptional cases transfer infectious germs from animal to animal by inoculation.

Various devices are resorted to, to prevent the attacks, as to sponge the skin with a decoction of walnut or elder leaves, of tobacco, to dust with Persian insect powder, to keep a light blanket or fly-net on the horse, to close doors and windows with fine screens and destroy by py-

rethrum any flies that have gained admission, to remove all manure heaps that would prove breeding places for flies, to keep the stalls clean, deodorized by gypsum and to spread them in trays of dry chloride of lime. For the poisoned bites apply ammonia, or a solution of one part of carbolic acid in twenty parts of sweet oil or glycerine, or one-fourth ounce bicarbonate of soda and one dram of carbolic acid in a quart of water may be used.

Stings of Bees, Wasps and Hornets. These are much more irritating than the bites of flies, partly because the barbed sting is left in the wound, and partly because of the amount and quality of the venom. When a swarm attacks an animal the result may prove fatal.

Treatment consists in the application of wet clay, or of a lotion of soda or ammonia, or of carbolic acid, or of sugar of lead two drams, laudanum one ounce, and water one pint. The embedded stings should be extracted with fine forceps or even with the finger nails.

Flea, or Pulex. The flea of man and those of the dog and cat, when numerous, will bite the horse and give rise to rounded swellings on the skin. To dispose of them it is needful to clear the surroundings of the grub-like larvæ as well as to treat the victim. The soil may be sprinkled with quicklime, carbolic acid, coal tar or petroleum; the stalls may be deluged with boiling water and afterward painted with oil of turpentine and littered with fresh pine sawdust, and all blankets should be boiled. The skin may be sponged with a solution of one part carbolic acid in fifty parts water. Dogs, cats, and pigs should be dressed with the same lotion, or, better removed from the vicinity of the stable.

The chigoe (*Pulex penetrans*) of the Gulf coast is still more injurious, because it burrows under the surface and deposits its eggs to be hatched out slowly with much irritation. The tumor formed by it should be laid open and the parasite extracted. If it bursts so that its eggs escape into the wound, they may be destroyed by introducing a wire at a red heat.

Lice, or Pediculi. Two kinds of lice attack the horse, one of which is furnished with narrow head and a proboscis for perforating the skin and sucking the blood, and the other (the broad-headed kind) with strong mandibles, by which it bites the skin only. Of the bloodsuckers one is common to horse and ass and another to horse and ox, while of the non-sucking lice one species attacks horse and ox and a second ox and ass. The poor condition, itching, and loss of hair, should lead to

suspicion and a close examination will detect the lice. They may be destroyed by rubbing the victim with sulphur ointment, or with sulphuret of potassium four ounces, water one gallon, or with tar water, or the skin may be sponged with benzine. The application should be repeated a week later to destroy all lice hatched from the nits in the interval. Buildings, clothes, etc., should be treated as for fleas.

Chicken Lice. This parasite, *Sarcoptes mutans*, belongs to chickens, but can live on the skin of the fox and horse as well. A troublesome mange may therefore at times be traceable to the proximity of a chicken roost. The general symptoms and treatment are essentially the same as for *sarcoptes equi*.

Itch or Mange. The *Dermatodectis equi* produces the most frequent mange in horses, and as the parasite only bites the surface and lives among the crusts under the shelter of a hair, it is very easily discovered. It reproduces itself with equal rapidity, and causes similar symptoms to those produced by the *sarcoptes*. The same treatment will suffice and is more promptly effectual. The purifying of the stable must be more thorough, as the *psoroptis* will survive twenty to thirty days in the moist atmosphere of a stable, and may even revive after six or eight weeks when subjected to moist warm air. Infested pastures will therefore prove dangerous to horses for that length of time, and with rubbing posts, etc., should be secluded.

Foot Mange. This *acarus* attacks the heels and lower parts of the legs, especially the hind ones, and may be present for years without extending upon the body. Like the *psoroptis*, it lives on the surface, on the hairs and among the scabs. It gives rise to great itching, stamping, rubbing of the one leg with the other, and the formation of papules, wounds, ulcerous sores, and scabs. The intense itching will always suggest this parasite, and the discovery of the *acarus* will identify the disease. Treatment is the same as for the *sarcoptes*, but may be confined to the legs and the parts with which they come in contact.

Poultry Ascariasis. This is a large-sized *acarus*, though usually miscalled "hen louse," and the disease "poultry-lousiness." The mite lives in the hen manure and adjacent woodwork, but temporarily passes on to the skin of man, and of the horse and other quadrupeds, when occasion serves. It causes much irritation, with the eruption of papules or vesicles and the formation of sores and scabs. The examination of the skin is usually fruitless, as the attacks are mostly made at night and the effects only may be seen during the day. The proximity of hen ma-

nure swarming with the acari explains the trouble, and the removal of this and a whitewashing with quick lime with or without chloride of lime will prevent future attacks. The skin may still require bland ointments or lotions, as for congestion.

Autumn Mange. This parasite is often called the Harvest Bug, misnamed Jigger (Chigoe), a brick red acarus, visible to the naked eye on a dark ground, and living on green vegetation in many localities. It attacks man, and the horse, ox, dog, etc., burrowing under the skin and giving rise to small papules and intolerable irritation. This continues for two or three days only if no fresh acari are received, but will last until cold weather sets in if a fresh colony is received every day. Horses at pasture suffer mainly on the lower part of the face. If kept indoors the disease will disappear, or if left at pasture a weak tar water or solution of tobacco may be applied to the face.

VEGETABLE PARASITES OF THE SKIN.

Ringworm or Tinea Tonsurans. This is especially common in young horses coming into training and work, in low-conditioned colts in winter and spring after confinement indoors and during shedding of the hair, in lymphatic rather than nervous subjects, and at the same time in several animals that have herded together. The disease is common to man, and among the domestic animals, to horse, ox, goat, dog, cat, and in rare instances to sheep and swine. Hence it is common to animals of different species and their attendants suffering at once, the diseases having been propagated from one to the other.

In the horse the symptoms are the formation of a circular scruffy patch where the fungus (*trichophyton tonsurans*) has established itself, the hairs of the affected spot being erect, bristly, twisted, broken, or split up and dropping off. Later the spot first affected has become entirely bald, a circular row of hairs around this are erect, bristly, broken, and split. These in turn are shed and a new row outside passes through the same process, so that the extension is made in a more or less circular outline. The central bald spot covered with a grayish scruff and surrounded by a circle of broken and split hairs, is characteristic. If the scruff and diseased hairs are treated with caustic potash solution and put under the microscope the natural cells of the cuticle and hair will be seen to have become transparent, while the groups of spherical cells and

branching filaments of the fungus stand out prominently in the substance of both, dark and unchanged. The eruption usually appears on the back, loins, croup, chest, and head. It tends to spontaneous recovery in a month or two, leaving for a time a dappled coat from the spots of short, light-colored hair of the new growth.

The most effective way of reaching the parasite in the hair follicles is to extract the hair individually, but in the horse the mere shaving of the affected part is usually enough. It may then be painted with tincture of iodine twice a day for two weeks. Germs about the stable may be covered up or destroyed by a whitewash of freshly burned quicklime, the harness, brushes, etc., may be washed with caustic soda, and then smeared with a solution of corrosive sublimate, one-half dram and water one pint. The clothing may be boiled and dried.

Matting of the Mane and Tail. This is known as *Plica Polonica*, and the parasite is *Tricophyton Sporuloides*. In this malady the mane and tail of the horse as well as the hair of men, is associated with numerous spores of a *tricophyton*, and is rationally treated by cutting off the hair and applying tincture of iodine or a solution of corrosive sublimate four parts to one thousand parts of water.

Favus or Honeycomb Ring-worm. It is caused by a parasite called *Achorion Schonleini*. Mengin and Goyau who describe this in the horse, say that it loses its characteristic honeycomb or cup-shaped appearance, and forms only a series of closely aggregated, dry, yellowish crusts the size of hemp seed on the trunk, shoulders, flanks, or thighs. They are accompanied by severe itching, especially at night. The cryptogam, formed of spherical cells with a few filaments only, grows in the hair follicles and on the cuticle, and thus a crust often forms around the root of a hair. Like the other cryptograms, their color, as seen under the microscope, is unaffected by acetic acid, alcohol, ether, or oil of turpentine, while the cells are turned bluish by iodine. For treatment, remove the hair and apply tincture of iodine or corrosive sublimate lotion, as advised under "Matting of the Mane and Tail."

Parasitic Pityriasis. This is caused by the parasite *Microsporon Furfur*. It attacks the horse's head where the harness presses, and leads to dropping of the hair, leaving bald patches covered with a bran-like scurf, without any eruption, heat, tenderness, swelling, or rigidity of the skin. A lotion of carbolic acid, one dram; and water, two and one-half ounces, is usually applied to effect a cure.

WOUNDS OF THE SKIN.

Fistulæ. The word fistula is properly applied to sinuous pipes or ducts leading from cavities to the surface of the body, through which a discharge is constantly taking place. They are lined by a false or adventitious membrane, and show no disposition to heal. *Fistulæ* may then exist at any part, but the name has come to be commonly accepted as applicable only to such discharges taking place from the withers, and we shall refer to this location when using the term.

Poll evil is a fistula upon the poll, and in no sense differs from fistulous withers except as to location. The description of fistula will apply then, in the main, to poll evil as well. *Fistulæ* are particularly liable to occur at either of these locations from the disposition of the muscles and tendinous expansions, which favor the burrowing of pus and its retention. *Fistulæ* follow as a result of abscesses, bruises, wounds, or long continued irritation by the harness. Among the more common causes of fistula of the poll (poll evil) are chafing by the halter or heavy bridle; blows from the butt end of the whip; the horse striking his head against the hayrack, beams of the ceiling, low doors, etc. *Fistulous* withers are seen mostly in those horses that have thick necks as well as those that are very high in the wither; or, among saddle horses, those that are very low on the withers, the saddle here riding forward and bruising the parts. They are often caused by bad-fitting collars or saddles, by direct injuries from blows, and from the horse rolling upon rough or sharp stones. In either of these locations, ulcers of the skin, or simple abscesses, if not properly and punctually treated may become *fistulæ*. The pus burrows and finds lodgment deep down between the muscles, and only escapes when the sinus becomes surcharged or during motion of the parts, when the matter is squeezed out.

Symptoms. These of course will vary according to the progress made by the fistula. Following an injury we may often notice soreness or stiffness of the front legs, and upon careful examination of the withers we will see small tortuous lines running from the point of irritation downward and backward over the region of the shoulder. These are superficial lymphatics, and are swollen and painful to the touch. In a day or two a swelling is noticed on one or both sides of the dorsal vertebræ, which are hot and painful and rapidly en-

larging. The pain may at this time subside somewhat, the stiffness disappear, but the swelling continues and increases in size. It fluctuates upon pressure, and either opens or its contents become inspissated, dry up, leaving a tumor that gradually develops the common characteristics of a fibrous tumor. When the enlargement has opened we should carefully examine its cavity, as on its condition will wholly depend our treatment.

Treatment. In the earliest stages, when there is soreness, enlarged lymphatics, but no well-marked swelling, the trouble may be frequently aborted. To do this requires both general and local treatment. A physic should be given, and the horse receives one ounce of powdered saltpeter three times a day in his water or feed. If the fever runs high, twenty drop doses of tincture of aconite root every two hours may be administered. Locally we will find much relief by pouring cold water from a height upon the inflamed spot for an hour at a time three or four times a day. Cooling lotions, muriate of ammonia, or saltpeter and water, sedative washes, as tincture of opium and aconite, chloroform liniment, or camporated oil are also to be frequently applied. I have seen a number of cases presenting these initial symptoms of fistula thus aborted that required no other treatment than the avoidance of the original cause.

When, however, the formation of pus is inevitable, this must be hurried as much as possible. Hot fomentations and poultices are to be constantly used, and as soon as fluctuation can be plainly felt the abscess wall is to be opened at its lowest point. In this procedure lies our hope of a speedy cure. If the parts are so laid open by the knife that the pus must escape as fast as it is formed, and where there is left no possibility of its burrowing between the muscles, forming pockets or sinuses, the parts rapidly and permanently heal without any mediation whatever, as though we had been dealing with a simple abscess of the withers, and not a true fistula at all.

Attention is again called to the foregoing directions to the necessity of probing the cavity when opened. If upon a careful examination with the probe we find that there are no pockets, no sinuses, but a simple, regular abscess wall, the indication for treatment is to make an opening from below so that the matter must all escape. Rarely is anything more needed than to keep the orifice open and to bathe or inject the parts with some simple antiseptic wash that is not irritant or caustic. A low opening and cleanliness constitute the essential and rational treatment.

If caustics are inserted, they cause sloughing of healthy tissues and favor the formation of sinuses by producing sloughs below the point of incision. If the abscess has existed for some time and has not opened, its walls become thickened, the pus granular or inspissated, then, after an opening has been made by the knife and the contents washed and squeezed out as much as possible, the plan of treatment is materially different. There is enormous thickening of the walls, which must be destroyed and sloughed out by caustics. The best plan here is to make the first incision in the highest point of the swelling, introduce a piece of caustic potash (fused) one to two inches in length, carefully plug the opening with oakum or cotton, and secure the horse so that he can not disturb the parts by rubbing or biting them. The skin of the shoulder and entire leg must be thoroughly greased with lard or oil in order to prevent the caustic (should it escape) from excoriating the skin over which it flows. Twenty-four hours after the introduction of the caustic the plug is to be removed and hot fomentations applied. As soon as the discharge is again established we must make another opening with the knife or seton needle as low as possible, and keep this open with a seton. The object of making the first incision on top is to insure the retention of the caustic until it has attacked the entire inner surface of the cavity. If this is done the caustic causes sloughing of every portion of the diseased parts, leaving a healthy granulating surface underneath, which only requires that the depending orifice be kept open and the cavity washed out with a weak antiseptic solution once or twice a week to effect a cure.

In many cases of fistula there is more than one sinus or pipe that must be explored, laid open with the knife if possible, or opened through its bottom by means of a sharp seton needle, passing a tape through the openings, and retaining it in this position for some time. If the pipes are directed straight downward between the shoulder blade and the spine it is difficult or impossible to make a counter opening, and the case becomes serious or intractable. Caustic solutions must now be injected carefully into the sinuses with the hope of reaching every diseased part. Probably the best is granular chloride of zinc, one ounce to a half pint of water. This should be injected three times during one week, after which a weak solution of the same, or the sulphate of zinc, is to be occasionally injected. Pressure must be applied from below, and endeavors made in this manner to heal the different pipes from the bottom. Should the bones of the withers or the shoulder blade be diseased the

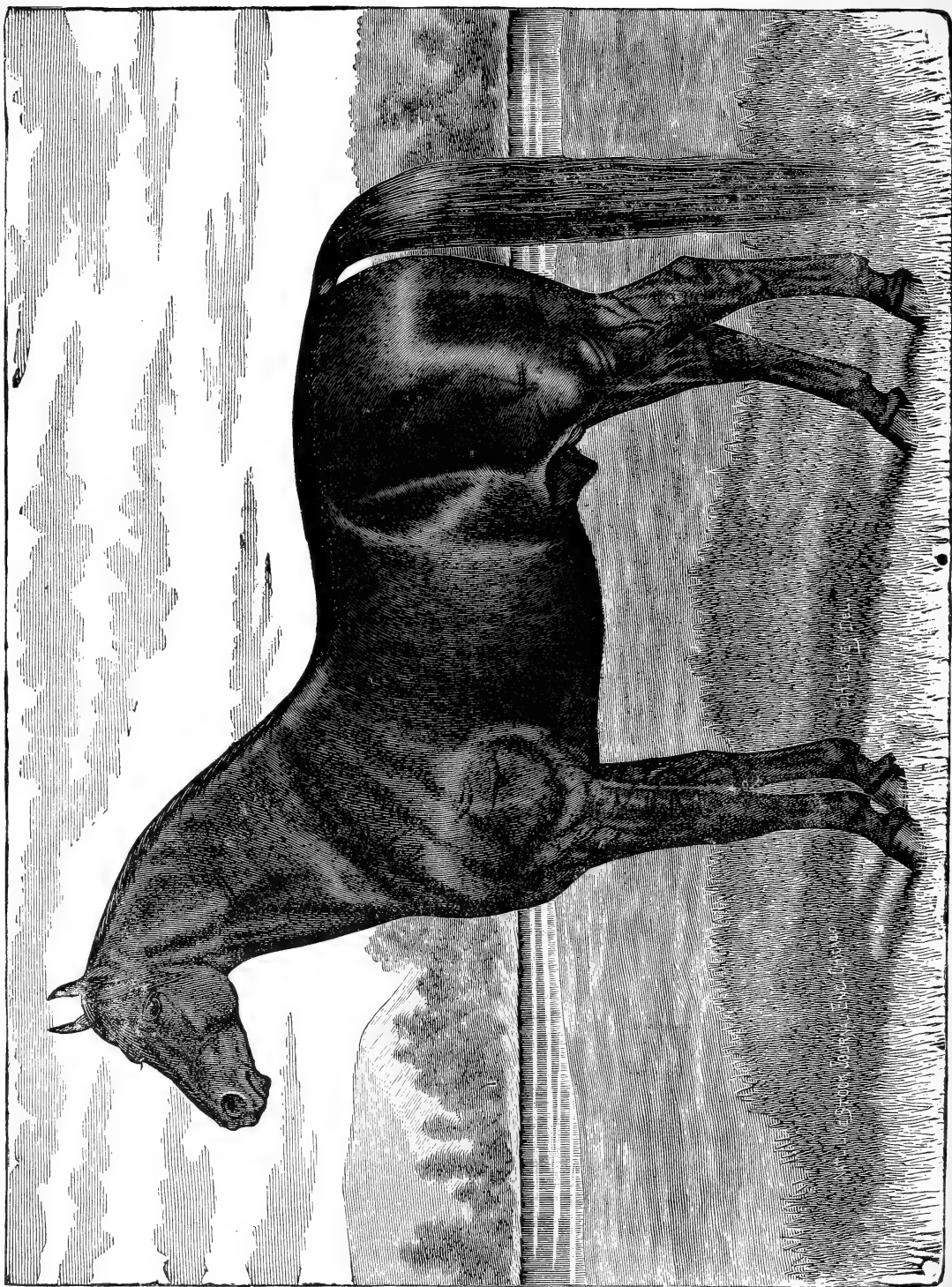
complication is again serious, and these must be scraped or portions of them removed.

In those cases of fistula where the tumor is large and hard, yet not sufficiently defined to admit of extirpation with the knife, we may often effect a cure by making a shallow incision under the skin, over the center of the tumor, and inserting from twenty to thirty grains of arsenious acid (powdered arsenic) wrapped in a single layer of tissue paper, and remaining in the same manner as before directed for the caustic potassa. No further treatment is necessary for some time. In about ten days to two weeks there will have taken place a large, deep slough, leaving a very ugly looking granulating wound, which, however, gradually contracts during the healing process and results in the entire disappearance of the tumor.

It is to be inferred from the foregoing that, even though fully established, fistulæ of the withers or poll are, in the majority of cases, curable. They often require much time and patient attention. The sinuses must be opened at their inferior extremity and kept open. At first caustic injections or applications must be thoroughly applied once or twice, after which mild astringent antiseptic washes and cleanliness complete the cure. In those cases where the sinuses or pipes are so directed that counter openings can not be made; where there are diseased conditions of the bones, articulations, etc., that can not be reached, the horse had often best be destroyed at once.

It is not at all unusual for fistulæ to break out again after having healed. This should not discourage us of a complete cure, as there is mostly only some small particle of diseased tissue remaining, caught, probably, in the healing of the orifice. A small abscess forms, points, and opens. The abscess should be injected with a solution of sulphate of zinc, twenty grains to the ounce of water, every second or third day until entirely healed.





CHAPTER XV.

SHOEING.

Its Advantages and Its Disadvantages.

WHY NECESSARY, COMMON ERRORS, PREPARING THE FOOT FOR THE SHOE, THE SHOE, FINISHING TOUCHES, WINTER SHOEING, SHOEING FOR A SPECIFIC PURPOSE.

WILLIAM DICKSON, the able veterinarian of the State Farmers' Institute of Minnesota, has the following to say on this important subject :

"It has sometimes been asserted that the history of every horse is a record of human endeavor to mar his utility. While the accuracy of such a sweeping assertion may fairly be called into question, there are undoubtedly respects in which the horse in domestication is very often the victim of his owner's ignorance, indifference, or even mistaken kindness, and in no particular is this more strikingly conspicuous than in the ordinary treatment of organs so vitally essential to his usefulness as his feet. No portion of the horse's economy has suffered so many wrongs, or as a natural consequence endured so much uncalled-for suffering, as his feet, and to shoeing a very large proportion of these evils is, beyond all doubt, directly or indirectly referable.

Unfortunately, under certain conditions, shoeing is an almost unavoidable consequence of the horse's domestication, and, although we may have no wish to uphold the traditional methods, we are driven to the conclusion that an artificial protection of some kind for the horse's foot is very frequently one of the penalties which civilization exacts.

That the ordinary iron shoe is the best and least hurtful means that could be devised, I am reluctant to admit; but, so far, even American ingenuity has failed to develop anything better suited to the purpose. That the system of horseshoeing, as it is practiced, even in the most skillful hands, is detrimental to the foot, no one who is conversant with the facts will venture to deny. As a matter of physiological fitness the shoe and its mode of attachment are utterly indefensible. Each time a horse is shod (every nail driven) means so much injury to the foot. The better the job the less that injury is; but there is no such thing as an absolute immunity from an evil which must always exist in inverse ratio to the skill displayed in the execution of the work.

These is, however, at least one very large and important class of horses to which shoes are by no means an habitual necessity, namely, our agricultural horses. The nature of their work, the pace at which they are required to perform it, and the character of the ground over which they ordinarily move, all unite to render artificial protection for their feet, save under exceptional circumstances, altogether uncalled for. When this is so, and when it is conceded that shoeing is, even under the most favorable circumstances, an evil (although in some cases a necessary one), a frequent cause of disease, and therefore a direct source of loss, it is a matter of deep regret that such a large majority of our farm horses, the very mainspring of our agricultural existence, should be needlessly subjected to a mutilation which curtails the period of their natural efficiency and too often renders their life thus shortened one long-continued agony.

Far too many blacksmiths are ignorant alike of the anatomy, physiology, and economic relation of the parts, they mutilate, and they cut and carve as whim, prejudice, or time-honored custom dictates. Disaster, it may be slowly, but surely, follows, and all too often the dumb creature's suffering foots the bill.

Foremost among them is the insane habit of trimming the frog and thinning out the sole till it visibly yields to the pressure of the operator's thumbs. The frog is nature's cushion and hoof-expander; by its elasticity it wards off concussion from the less elastic portions of the structure, and by its resilience assists in maintaining the natural state, but the drawing-knife's touch is fatal to it. Once cut and carved and deprived of pressure, those very acts cause it to shrink, dry, and harden, and at once lose those very attributes which constitute its usefulness to the foot. Robbed of its elasticity and resilience, it is incapable of dis-

charging its allotted functions—both as a cushion and as an expander it is a dead failure; indeed, it is worse, as in its altered character it is now a menace instead of a protection, a bane rather than a boon to the foot that wears it.

The destruction of this important factor having been thus accomplished the operator probably next turns his attention to the sole, which, by all traditions of the craft, must be pared down until only a thin film of soft, partially formed horn is left to protect the living structures within against injury from the substances with which the foot necessarily comes in contact. Nor does the mischief stop here. The sole itself, or what is left of it, consists now of soft, moist, half-formed horn, which dries and skrinkles on exposure to the air, and thereby entails a further and a still more serious injury on the foot.

There seems to be a fascination about this work of destruction, and the incompetent workman next addresses himself to the self-imposed task of improving upon nature by removing the bars and what he calls "opening" the heels, a process which, in plain language, means opening a road for them to close over. On this poor, maimed foot a shoe, often many sizes too small, is tacked, and the rasp is most likely called into requisition to reduce the foot to fit the shoe; for although it is apparently of little moment whether the shoe fits the foot, it is indisputably necessary that the foot should, somehow or other, be got to fit the shoe, and horseshoeing, like other arts, must needs sacrifice on the altar of appearances. It is sad that art and nature should so often be at variance, and that what satisfies the one should outrage the demands of the other.

The foot is now shod and protected from undue wear, to be sure, but at what a sacrifice! Robbed of its cushion, its natural expander; its lateral braces removed; its sole mangled and its natural repair arrested; the hair-like fibers which make up the horny wall crushed, deflected, and their nutritive function impeded by an unnecessary number of nails; robbed by the rasp of its cordial layer of natural varnish, which retains the moisture secreted by the economy, the strong walls become dry and weakened, and the foot is in a very sorry plight indeed. To some this picture may seem overdrawn, but it is nevertheless a matter of daily occurrence.

Of course, even among agricultural horses, there are individuals which can not work unshod; but these are exceptional cases. Then again, in winter, when the usual snowfall is wanting, most horses' feet will re-

quire protection; but nowadays an owner has himself to blame if he submits to having the work done in that wrong-headed and ridiculous manner, which has called into existence such a long list of diseases and misery.

The horse's foot is, after all, a good deal of what we make it, and if our horses, from their colthood up, had their feet more carefully attended to, and especially were they invariably to stand while in confinement or some material less deleterious to the hoof than dry wooden flooring, from which the foot suffers no irritation whatsoever, and by which it is moreover depleted of its natural moisture, their feet would, in the period of the animals' active usefulness, be found to be better shaped, harder, less brittle, and in every way better suited for the work required of them.

There is one instrument which I should like to see, if possible, omitted from the shoeing outfit of every farrier, and that is the drawing-knife. If our blacksmiths would use their knives less and their heads more in the execution of their very important and by no means easy duty, our horses would be the better for it, and so would their owners. There is no great mystery surrounding the subject, and the application of ordinary common sense, in lieu of the barbarous routine which has been so long handed down from generation to generation until it has actually become a portion of the blacksmith's creed, would go a long way towards obviating many, if not most, of the cruel wrongs to which our horses' feet are day by day needlessly subjected.

The outside, or horny wall, and that portion of the sole which is in immediate contact with it, on which the shoe should rest, are the only portions of the foot which require to be interfered with in preparing the foot for the shoe, and all the trimming that is necessary can and ought to be effected by means of the rasp. The frog and sole should on no pretext whatever be meddled with, save to the extent I have indicated. Their presence in their entirety, and in their natural state, is essentially necessary to the well-being of the foot, and neither brooks the touch of the steel.

There may be differences of opinion among authorities as to minor details in shoeing, but there is at all events one issue on which it is satisfactory to know that there is absolute unanimity; one practice which all alike utterly condemn; and that is the irrational treatment of the frog and sole, to which I have already alluded.

Sufficient care is not always given to shortening the hoof so that its

angle should conform exactly to the inclination of the limb. It would be misleading to lay down any arbitrary degree of obliquity. The angle differs in different cases; and the natural bias of the superimposed structures is the only safe guide to follow. More than one instrument has been devised for ascertaining the correct degree of obliquity, some of them simple and efficacious; but an inspection of the foot in profile is usually the best way of deciding. Too much importance can not possibly be attached by the workman to this and the succeeding step, namely, leveling the ground surface of the foot, as the slightest departure from exactitude here renders whatever amount of care he may devote to the completion of his work worse than useless. The very smallest deviations from the perpendicular causes disastrous consequences not only on the foot but on the entire limb. In the foot itself, when the weight is borne unevenly, the lowest parts receive an undue share; the pressure retards the growth of new horn, and the foot in consequence becomes weakened, distorted, and deformed.

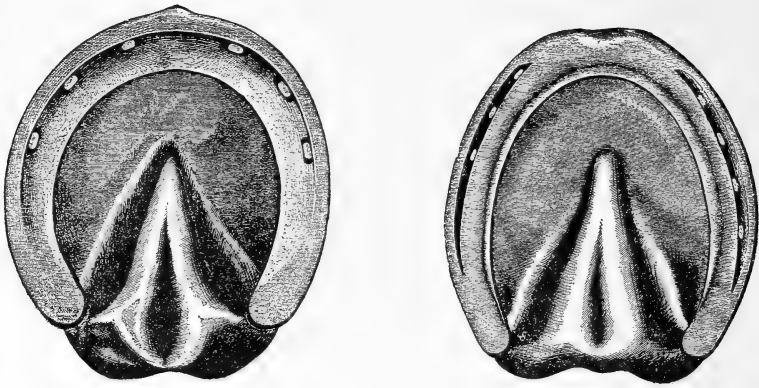
The Shoe. The shoe should be as light as the weight of the animal and the nature of the work he is expected to perform will admit. Heavy shoes not only burden the animal which is condemned to wear them, for there is truth in the old adage, "an ounce at the toe means a pound at the withers;" but they also increase the concussion inseparable from progression, so even in the trotter, whose work is meted out to him with judicious care, although the weight doubtless accomplishes the work for which it was intended, it is a draft at usury on the horse's future soundness, which that animal is bound to take up at maturity.

The legitimate mission of the shoe is to prevent undue wear of the walls, and a light shoe will do this quite well as a heavy one; it is moreover entirely erroneous to suppose that a heavy shoe necessarily wears longer than a light one, as experience proves the contrary, in many instances, to be the case. Even among our mammoth draft horses, whose shoes must of course be made with reference to the weight they have to bear and the inordinate strain to which they are subjected when the animal which wears them is at work, I am not prepared to admit that it is by any means necessary to add to the concussion to which his feet are unavoidably subjected, by several pounds of unyielding iron on each foot, when shoes weighing half as much would serve the purpose equally well. The lamentably short career of our city draft horse, which is usually determined by foot lameness of one kind or another, is largely

attributable, to the aggravated amount of battering on hard pavements which his needless weight of shoes causes.

The upper surface of the shoe should be perfectly level. If the plane of the web inclines from outward inward, it greatly adds to the unavoidable tendency to contraction which shoeing invariably entails, and there is a wealth of unwisdom in most of the clumsy attempts at mechanically spreading the heels by making the inclination in the contrary direction.

It would seem to be unnecessary to say that the shoe should be so shaped as to conform exactly to the natural tread of the foot, yet there is a very common practice of using a shoe of uniform shape, often less in circumference, if such a term is permissible, than the foot on which

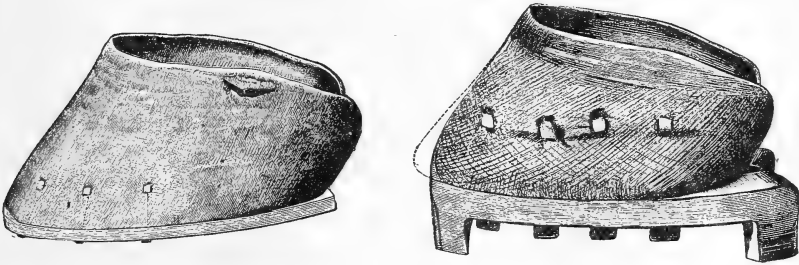


HIND-FOOT AND FORE-FOOT WITH SHOE PROPERLY ADJUSTED.

it is to be nailed, and then rasping down the foot to fit it. It is easier to make the foot to fit the shoe than it is to make the shoe to fit the foot; a stroke or two of the rasp effects the former, but it is a far more arduous undertaking to modify the size and shape of the shoe. The outcome of this pernicious practice is disastrous in the last degree, more especially so in a dry climate like ours, as the walls thus robbed of their natural covering permit the moisture of the foot rapidly to evaporate, and the horn fibers, which make up the outside walls, instead of being compactly knit together, readily disintegrate, and in the course of a shoeing or two those very portions in which the nails should take firm hold possess little more adhesion than a bundle of broom corn. If the shoe fitted as it should, a touch of the rasp under each clinch would be

all that was necessary, and even this much might advantageously be dispensed with.

Fitting. In many countries what is called hot-fitting, that is to say, after the foot has been trimmed and leveled, momentarily applying the shoe at a red heat to the foot, is generally practiced to the almost entire exclusion of any other method, and the system is not only found to answer, but receives the indorsement of the most competent authorities. The climatic conditions which render the practice open to objection in this hemisphere fortunately enable us to dispense with a procedure against which there exists in the minds of many horse-owners a not unreasonable prejudice, which, however, is directed at the abuse rather than the intelligent application of a proceeding not necessarily hurtful



SHOE OF PROPER SHAPE, WELL ADJUSTED AND PROPERLY NAILED ON A THREE-YEAR-OLD HORSE SHOD FOR THE FIRST TIME.

SHOE AND NAILS TOO LARGE. NAILS TOO MANY AND DRIVEN TOO DEEP. SHOE SET BACK TOO FAR. HOOF RASPED AWAY TOO MUCH.

in itself. The advantage conferred by hot-fitting consists in the fact that a more accurate accommodation is by this means more readily obtained than by any other method, and the contact between hoof and shoe can thus be made more intimate and enduring. In moist climates it is only by means of hot-fitting that a set of shoes can be made to remain on for a reasonable length of time; but in no part of this country have I found any difficulty of this nature; indeed, on the contrary, shoes are usually allowed to remain on too long, especially in the agricultural districts.

It has frequently occurred to me, when in the discharge of my duties as veterinarian to the Farmers' Institute of Minnesota, I have remonstrated with some local blacksmith at the number of gigantic nails he employed in affixing a shoe, that I have been assured that

did the shoe not remain on for several month his employer would be dissatisfied and would transfer his custom elsewhere. Nothing could be more short-sighted nor more unreasonable than such conduct.

The hoof of the horse is in shape a truncated cone with the base downwards; as it grows the circumference of the base consequently increases, and the shoe fitted when it was newly put on after a time becomes too small. It would be just as reasonable for a horse-owner to buy his little boy a pair of shoes which just fitted him when he was six years old, and then expect him to wear them until he was twelve, as it is for him to require his dumb servant, who can not protest against the infliction, to wear his shoes for months in succession without resetting. A badly fitting shoe is to a horse as painful as a tight boot is to his owner, and under no circumstances should shoes be permitted on more than a month or five weeks at the outside; many animals require to be reshod even more frequently. It is only when an owner lets his stinginess overcome his reason that he allows himself to follow a penny-wise and pound-foolish policy, which can only result, as such policies invariably do, in a loss.

Nails. The fewest nails, and these of the smallest size, that will keep the shoe on for the proper length of time, is a rule that should never be departed from. The nail holes should not be punched too fine, that is, too near the outside edge of the web of the shoe (this is a very common failing of "keg shoes") if punched coarser the nails will take a thicker and lower hold of the walls, and in this way obviate their having to be driven so high up as to approach dangerously near the sensitive structures. Two of the commonest errors in shoeing are using too many nails and these of an altogether unnecessary size, and then driving them too high up into the walls. If a perfectly level bearing has been obtained (as ought to be the case) it is astonishing how few and how small nails will hold the shoe firmly in its place; but let the fitting be carelessly done, then, no matter how the shoe may be nailed on, but a short time elapses ere the clinches open and the shoe works loose. When we bear in mind that the wall of the hoof consists of a number of hair-like tubes cemented together, and that each tube is one of an infinite number of minute canals, which diffuse throughout the horn a fluid that nourishes and preserves it, it will be readily understood that each nail driven into the wall deflects those little tubules, probably absolutely closing those with which it comes into actual contact and hurtfully compressing those lying half way between the nails, thus impairing if not.

destroying their utility and cutting off the supply of material necessary to the foot's existence. If we could dispense with nails altogether our horses' feet would be better off. This, unfortunately, we apparently can not do, but we have it in our power to minimize an evil which, at present, at all events, we can not entirely avoid.

There is one shoe, without some allusion to which an essay of this kind would be incomplete, namely, the "Charlier shoe," invented some years ago by M. Charlier, a well-known veterinarian surgeon of Paris, France, which has never, in my opinion, received either the attention or trial its merits deserve. Common sense and science alike indorse it, and were the system to become generally known in this country I venture to assert that there is an extremely large number of cases in which it would be found both appropriate and beneficial. For this reason I will briefly describe it. The shoes used are about one-third the weight of an ordinary shoe, and less than one-half the width. In preparing the foot for shoe and sole, frog and bars are left, as they ought to be, absolutely untouched, and a groove is cut, by means of a knife specially designed for the wall, not high enough to reach above the sole level, and less than the thickness of the wall in depth. Into this groove a narrow but thick band of iron is sunk and nailed to the foot by means of four to six conical-headed nails, the heads being countersunk in the shoe. The advantage of this method of shoeing is that the frog, bars, and a portion of the sole come to the ground exactly as if the foot were unshod, and one and all participate in weight-bearing as it was obviously intended they should, while the wall is protected from wear by the small rim of iron let into its ground surface.

I have used both the Charlier shoe and the tip in this country as well as in the East Indies, and I am perfectly satisfied that in many respects they are superior to any other model. They are infinitely lighter, the nails are smaller and fewer in number; all steps in the right direction; but the dominant superiority of the device consists in the fact that the frog obtains pressure to the extent contemplated by nature, and in the case of the Charlier tip particularly the exercise of its double function as a buffer and dilator is absolutely untrammelled in any way by the shoe.

Finishing Touches. When the shoe has been fitted, the nails driven, drawn up, and clinched, there should be nothing left to be done. Very frequently, however, it is just at this stage that the incompetent workman, in the most uncalled for manner, inflicts serious and lasting

injury on the foot. If the wall has not been sufficiently reduced in leveling the foot, or if the shoe used is too small, the rasp is required to reduce the projecting parts. Often, indeed, when there is not even this pretext, the whole surface of the foot is subjected to its relentless touch. No procedure could well be devised which would be more hurtful to the foot. In its natural state the entire hoof, from the coronet to the sole level, is covered by a fine coating of natural varnish, thickest at the upper margin and gradually becoming thinner as it descends. Under cover of this beneficent curtain the new horn is secreted and protected until it has attained maturity. The moisture secreted by the animal economy, necessary to the perfection of the horn, is retained within it, and the prejudicial influences of alternating drought and moisture are set at defiance. In a very dry atmosphere like ours it is of great importance that this beautiful shield should be preserved and fostered, and no name is bad enough for a custom which, to serve no good purpose, robs the foot of a necessary protection which it is beyond the power of art to imitate or replace.

Winter Shoeing. The subject of winter shoeing presents, in many sections of the country, fresh difficulties, for now the shoe is required, in the case of all classes of horses, to discharge a double duty; to afford foot-hold as well as guard against undue wear. Various patterns of shoes have from time to time been invented to meet this double requirement, but the commonest of all, fashioned with shoe and heel calks or calkins, is, faulty though it be, probably, all things considered, the one which best suits the requirements of the case. It should, however, never be lost sight of that the shorter, the sharper, and the smaller the calkins are, so long as they answer the purpose which called them into existence, so much the better for the foot that wears them. High calkins, while they confer no firmer foot-hold, are potent means of inflicting injury both on the foot itself and the superincumbent limb at large. It is only from that portion of the catch which enters the ground surface that the horse derives any benefit in the shape of a foot-hold, and it must be apparent to the meanest capacity that long calkins, which do not penetrate the hard, uneven ground, are so many levers put into the animal's possession to enable if not compel him to wring his feet, rack his limbs, and inflict untold tortures on himself.

I have laid particular stress on this subject, as I am of opinion that the presence of navicular disease, a dire malady from which horses used for agricultural labor should enjoy a practical immunity, is traceable

largely to the habitual use, during our long winter months, of needlessly large calkins, only fractional parts of which find lodgment in the earth or ice during the progression. When a horse is shod with the exaggerated calkins to which I have alluded, the toe and heel calks are, or ought to be, the same height, to start with, at all events. Very often, however, they are not, and even when they are, the toe calk wears down on animals used for draft purposes far more rapidly than its fellows at the heel. The result is that the toe is depressed while the heel is unnaturally raised.

The relative position of the bony structures within the foot is altered, and the navicular bone, which is not one of the weight-bearing bones, is brought within the angle of incidence of both weight and concussion, influences which it was never contemplated it should withstand, and which its structure precludes its sustaining without injury. The bone becomes first bruised and then diseased; the tendon, to which it was intended it should act as a pulley, which passes over and is in constant contact with it, before long also becomes implicated, and what is technically known as navicular arthritis is thus engendered and developed.

Shoeing for a Specific Purpose. Thanks to the amount of attention which every detail that could possibly tend to the more perfect development of that paragon of horseflesh, the American trotter, has received at the hands of all classes of men, the matter of shoeing for specific purposes has made greater progress in America than in any other country on the face of the globe, and that is a department of the farrier's art which is justly entitled the highest eulogium that can be bestowed upon it.

The different styles of shoes which have been devised are marvels of ingenuity, and many of them are admirably effective as remedial agents of faulty gaits and uneven action. Their number is infinite, but as, many are applicable only, or in a large measure, to horses used for speed purposes only, any attempt at classification or detailed description would be out of place in a work of this kind. When intelligently applied a considerable number are, however, potent auxiliaries in mitigating in some cases the results of natural defects of conformation amongst animals whose lot is cast in the humbler if more useful fields of horse enterprise. Among these are the scoop-toed or roller-motion shoe for the fore-feet and the shoe for the hind-feet, which, while they obviate "forging" or "clicking," a habit hurtful to the horse and singularly

annoying to his driver, do not in any way tend to inflict injury on the feet or limbs. The scooped or rolled toe confers a mechanical advantage, enabling the animal to get over his toes more promptly and thus remove the front foot from the stroke of the hind extremity, while the lengthening of the branches of the hind shoes, by increasing the ground surface, retards the flexion and extension of the hind limbs.

The common practice of increasing the weight of the outside web of the hind shoes, to open the action, is equally harmless and efficacious when not carried to extremes.

There are many other styles of shoes, the product of American ingenuity, for which probably equal merit might be claimed, but there are others, which, while they may cure or mitigate the special defect against which they are directed, only do so at the expense of some other portion of the structure. It has many a time furnished food thought to the writer, that, in this great commonwealth, while there are such a large number of artificers who make horse-shoeing a profession, who offer such convincing testimony of a vast amount of careful thought and patient study of at least some of the principles of their very important profession as many of these devices afford, the bulk of such work should be permitted to fall into the hands of a set of incompetent, ignorant, and oftentimes unprincipled bunglers, who prey upon the credulity of their employers and inflict upon the most generous of all our dumb servants an amount of injury which curtails the period of his usefulness and results in his premature decadence at an age when he ought to be still in his prime.

In the meantime it behooves us to make the most of the means within our power. Our horses are national property. Surely, therefore, it is time that the possibility of a great national economy was recognized, and some legislation formulated which would require an established standard of attainment in a class of workmen to whose care property of such value is habitually intrusted, and upon whose proficiency, or the reverse, so much of its utility or comparative worthlessness depends, while it, at the same time, provided for some means of practical instruction which contemplated raising the science of horse-shoeing above the baneful influences of ignorance and traditional routine, to that position to which importance to us as a people justly entitles it."

CHAPTER XVI.

THE TEETH.

Age As Indicated By The Teeth.

ALTERATIONS IN THE TEETH, CLASSIFICATION OF THE TEETH, TEMPORARY TEETH, PERMANENT TEETH, PARROT MOUTH, BISHOPING, ETC., ETC.

THE principal guide in determining the age of a horse, up to the sixth year, consists in the structural alterations that take place in the teeth. The mouth of the horse at that age is said to become complete and thereafter the age can only be approximately determined by the effects of wear, in altering the shape of the teeth, by the receding of the gums and their characteristic signs.

Many circumstances, however, often contribute to modify the effect of wear on the teeth, and also to increase and decrease the action of time in other respects. Therefore, after six years old, an approximately correct opinion can only be formed by those who have given the subject some attention, thought and trouble.

Classification. The teeth in the anterior (front) part of the jaw are called the incisors and are six in number in each jaw, when the mouth is complete. In the males, in the intermediate rear of these, on each side in each jaw, there is usually added one peculiarly pointed tooth called a tusk. The back teeth are called molars or grinders and when complete are twenty-four in number, twelve above and twelve below. A supplementary molar known as a "wolf's tooth" sometimes appears in either jaw.

Back-teeth, or Molars or Grinders. At birth the foal usually has two, sometimes three, temporary molars in each jaw. When about

one year old another molar, a permanent tooth, appears and before two years of age, a fifth molar, also a permanent tooth, shows itself.

When about two and a half years old the two front temporary molars give way to permanent teeth, and between three and four years of age the remaining, or third, temporary molar also is replaced by a permanent tooth. About this time the last or sixth permanent molar begins to appear. Thus at about four years of age so far as the number of molars is concerned the mouth is completed, there being six permanent molars on each side both above and below, or twenty-four in all.

These changes are a very good index of the age of the horse up to the period when they are completed, that is four years old. The molars are, however, seldom referred to, because it is somewhat difficult to examine them. Yet, whenever there is a doubt as to the age indicated by the front teeth (incisors), it is a good place to look for verification. After four years of age they are not a good indication of age.

A "Wolf's" tooth sometimes appears in either jaw. Such teeth do not often cause trouble, but if they do, they can be easily removed with a pair of pincers, as they are not deep seated.

Incisors or Front Teeth. The front or anterior teeth are six in number in each jaw, when the mouth is complete. In the male on each side in the immediate rear there is usually added a very peculiarly pointed tooth called a tusk. Though there are two sets of incisors, a temporary set and a permanent set, yet there is only one set of tusks. They usually begin to make their appearance when the horse is about four years of age, yet they are not usually fully developed till the last permanent incisor is more or less up. The incisors in the upper jaw are considerably longer and larger than those in the lower jaw.

Temporary and Permanent Incisors. There are well marked signs by which the temporary or milk teeth can be distinguished from the permanent ones. The temporary teeth are smaller, whiter, and have more distinct necks. They are smooth on their outsides, and grooved inside. The fangs of the teeth are small and they have but little attachment to the gums. They are arranged in something like a half circle, in a plump, fleshy, round jaw.

Permanent teeth are larger, broader and wider in their necks, grooved externally and smooth internally, and not so white as the milk teeth. The discoloration is due to the juices and other matters connected with the teeth lodging in the grooves. The external grooving enables the animal to get a better grip on herbage, which is not necessary for the sucking

colt which feeds on its mother's milk and on young and more tender food than does the adult horse. The circular form of the position of the teeth is less in the adult horse than in the colt, and gradually grows less as the horse grows old, until in old age the incisors are arranged in nearly a straight line.

Temporary Teeth. The foal is born with his teeth in a rudimentary state in the gums. During the first ten months the different temporary incisors appear.

Yearling. The yearling has complete in all six incisors in each jaw. The teeth show but little wear and the corner teeth are mere shells, having inner walls, and all the teeth are close together.

Two-Years-Old. At this age the inside walls of the corner teeth have grown up level with the outer wall. The center teeth show considerable wear and appear smaller than in the yearling on account of the increase in the size of the jaw. They have become somewhat wider apart at their necks.

Three-Years-Old. The horse sheds the two center teeth a few months before he is three years old and they are replaced by permanent ones. Thus the jaw at three years of age contains two centre permanent teeth and two temporary teeth in each side.

Four-Years-Old. A few months before four years old the horse sheds the two next milk teeth, which are replaced by permanent ones. Thus at four years of age the jaw contains four permanent teeth and one milk tooth on each side.

Five-Years-Old. The remaining milk teeth are shed a short time before the horse becomes five years of age and are replaced by permanent ones. The jaw is now complete, but the corner teeth are shells, having no inner walls. The absence of this wall distinguishes the five from the six-year-old mouth.

Six-Years-Old. The inner wall of the corner permanent teeth have by this time grown up level with the outer wall. The mouth now being complete in incisors, and no further structural changes take place in them. As a general rule, the upper temporary teeth fall out sooner than the lower ones.

Up to six years of age, since there are structural changes, there can be but little doubt as to the age of the horse. High feeding encourages growth of the teeth as well as of other parts of the body, therefore thoroughbreds are somewhat more forward in their mouths than half-breed animals.

The Mark. There is a very peculiar hollow extending, when the tooth first comes up, about a half an inch down the temporary and rather deeper down the permanent. This is known as the mark or Infundibulum. Up to the age of six there is no use spending time in studying these marks, not because they do not show some indication of age, but because the structural changes detailed above are more reliable.

After six years have been reached, recourse must be had to the indications given by the marks and other slight, but gradual alterations which take place in the form of the teeth.

The Construction of the Tooth. The tooth as it originally appears consists of four walls of enamel. The remainder of the tooth consists chiefly of dentine, less hard than enamel, and more like ivory. A small quantity of crusta petrosa is also found on the outside.

This hollow affords lodgement for the debris of the food and only a short time after it makes its appearance it looks black. As the tooth wears down the hollow of course disappears, but the surface of the dentine immediately below the original hollow, being a somewhat soft material, has become stained for some distance down. Therefore the black mark remains. With the further wear of the tooth in time this stained portion wears away, and the mark is then out. It is at this age when artificial marks are burned into the tooth to deceive the inexperienced.

The time required for this mark to wear out varies with the class of food on which the animal has been fed, therefore it is not an exact guide, yet it may be relied upon to a greater or less degree as an indication of age.

General Rules as to the Mark. Between three and five years old the marks are very plain in all the permanent incisors. At six the marks are wearing out of the two centre teeth, which came up at three years old. They are plain in the two next, and perfectly fresh in the two corner teeth.

Seven-Years-Old. At this age the marks from the center teeth have worn away and those in the two next are wearing out, and are distinct and plain only in the corner teeth.

Eight-Years-Old. Here we find the marks as described have disappeared from all but the corner teeth in which they are becoming indistinct. The faint outlines are to be seen and they will be found to be very elliptical.

Nine-Years-Old. At this age there are not usually any marks found in the teeth. Faint outlines are still seen being most pronounced in the corner teeth.

Over Nine Years Old. For a couple of years after the true marks have disappeared there will still be found a trace of the enamel in the form of a star. This enamel lined the bottom of the original hollow and underlaid it for some distance. As the teeth wear this star decreases in size. At twelve or thirteen years of age the last traces of the enamel have usually disappeared even from the corner teeth but it may remain some time longer.

Effect of Different Kinds of Feeding. The time required for the teeth to wear down depends much upon the natural hardness of the teeth and the kind of food on which the horse is fed. Grass-fed horses usually retain the marks a couple of years longer than those fed on hard food. Again in horses where the upper teeth overlap the lower jaw, the marks will remain many years.

Horses that bite the manger, wear down their teeth very rapidly, and lose the marks very early. Horses feeding on salt mashes and on grasses which have been washed by the sea lose the mark quickly.

Bishop-ing. There is a practice among some dishonest horsemen of trying to imitate the marks by the use of caustic or the hot iron. The fraud is easily detected, because, though it is easy to make a BLACK mark in the center of the teeth, yet it is impossible to put in the walls of pearly enamel which surrounds the natural mark.

Fang-Hole or Secondary Mark. There is a secondary mark which may or may not appear at nine years of age. A slight trace usually appears at that age in the center teeth and of course later in the other teeth. If it shows at all it is a good sign that the horse has reached at least twelve years of age. There is no actual hole because with advancing years the upper part of the original cavity has become filled with a kind of dentine, which is more yellow than the true material of which the body of the tooth consists. This affords no true index to age and is mentioned to caution the mistaking of this for "the mark." The enamel of the mark it will be remembered is pearly white, while the mark of this secondary fang-hole is brownish yellow.

Further Changes. At nine it will be seen the "marks" entirely fail as an indication of age and indeed at seven and eight are not always to be depended upon. After this age the best indications of age are given in the gradual alterations in the shape of the teeth from wear and in closing the mouth. The teeth are broad (extending from corner to corner of the mouth) in the young horse and gradually grow thin toward their necks and fangs. In very old horses there is often a marked space between the teeth.

Shape of the Teeth. The teeth as they diminish in lateral breadth they increase in proportionate thickness from front to back.

At six and up to eight the teeth are all broad laterally at their upper surfaces.

At nine, when the marks fail, the two center teeth have become somewhat triangular.

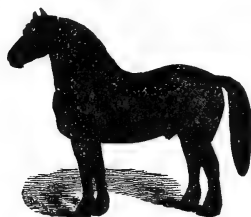
At ten the two next show similiar signs.

At eleven, the two corner teeth have become somewhat triangular.

At twelve, the triangularity has increased in all the teeth, and continues to increase until in very old horses the depth from front to rear exceeds the lateral width.

From these facts the reader will perceive that after six years old, i. e., after the structural changes in the mouth are completed, it is impossible to lay down any one single definite rule by which the age can be ascertained. Still, with a little trouble and attention there is no real difficulty in acquiring a knowledge of the horse's age up to a comparatively late period of his life.

Such a knowledge is always valuable to an intending purchaser. Horses of eight or nine years old are still in their prime; but from want of knowledge of the means of ascertaining the real age and from very natural distrust of what the owner may tell them, the public are very shy of buying such horses; and consequently they may generally be obtained at prices below their real value.



EXPLANATORY KEY

—TO—

MANIKIN OF THE COW.

ANATOMICAL DIVISIONS.

1. Frontal crest.
2. Horns.
3. Forehead.
4. Bridge of the nose.
5. Upper lip.
6. Nostrils.
7. Root of the ear.
8. Cheek.
9. Ear.
10. Throat.
11. Nape of the neck.
12. Dewlap.
13. Withers.
14. Back.
15. Loin.
16. Breast.
17. Walls of the chest.
18. Belly.
19. Flanks.
20. Upper part of flank.
21. Rump.
22. Haunches.
23. Root of tail.
24. Tail.
25. Tuft.
26. Perinæum with lacteal shield.
27. Udder.
28. Shoulder.
29. Point of shoulder.
30. Fore-arm.
31. Elbow.
32. Knee.
33. Shin, metacarpal bone.
34. Fetlock joint with dew-claws.
35. Pastern.
36. Coronet.
37. Hoop.
38. Hip-joint.
39. Upper thigh.
40. Stifle-joint.
41. Lower thigh.
42. Hock.
43. Point of hock.
44. Shin, metacarpal bone.
45. Fetlock joint.
46. Pastern.
47. Coronot.
48. Hoofs.

THE MUSCLES.

1. Circular muscle of eye.
2. Eyelid.
3. Middle abductor of ear.
4. Inferior abductor of ear.
5. Superior abductor of ear.
6. Elevator of lip and nose.
7. Elevator of upper lip.
8. Pyramid muscle of nose.
9. Zygomaticus.
10. Lacrymalis.

11. Depressor muscle of upper lip.
12. Sinews of sterno maxillaries.
13. Masseter.
14. Sterno maxillaries.
15. Abductor of ear.
- 16—17. Muscle of head and neck.
18. Part of sterno maxillary.
19. Great pectoral.
20. Anterior pectoral.
21. Inferior elevator of shoulder bone.
22. Trapezium.
23. Trapezium.
24. Long brachial extensor, anterior.
25. Long brachial extensor, posterior.
28. Triceps extensor brachii, external head.
29. Triceps extensor brachii, great head.
30. Scapular ulnaris.
31. Latissimus dorsi.
32. External oblique abdominal.
33. Serratus magnus.
34. Rectus.
35. Metacarpus extensor, the great.
36. Digitalis extensor, common.
37. Digitalis extensor, external.
40. Flexor of foot.
- 41, 43 to 47. Tendons.
42. Deep flexor of toes.
48. Annular ligament of fetlock.
50. Inner hoof extensor, sinew.
51. Gluteus maximus.
52. Vagina femoris.
53. Femoris, rectus.
54. Femoris, biceps.
55. Biceps, posterior portion.
56. Semitendinosus.
57. Gluteus.
58. Caudal curvator.
- 59—60. Pedis flexors.
61. Abductor.
62. Peroneus.
63. Soleus.
64. Gastrocnemius.
65. Extensor communis.

- 66—67. Extensor.
68. Tendon of Achilles.

CIRCULATORY SYSTEM.

1. Aorta.
2. Anterior aorta.
3. Posterior aorta.
4. Left inominate artery.
5. Left coronary artery.
6. Right inominate.
8. Left carotid.
9. Right carotid.
10. Arteries which supply windpipe.
11. Parotid gland artery.
12. Pharyngean artery.
13. Occipital artery.
14. External artery.
15. Lingual.
16. Facial.
- 17—18. Coronary arteries.
19. Lower dental.
20. Upper labial.
21. Temporal.
22. Lower eyelid.
23. Anterior intercostal.
24. Oblique cervical
25. Deep cervical.
26. Vertebral.
27. Pectoral, exterior.
28. Pectoral, interior.
29. Radial.
30. Metacarpal major.
31. Metacarpal minor.
32. Diaphragmatic.
33. Bronchial.
34. Intercostal, ten pairs of.
36. Cœlic axis.
37. Anterior mesenteric.
38. Renal.
39. Spermatic.
40. Posterior mesenteric.
41. Lumbar, six pairs.
42. Pelvic.
43. Arteries of the thigh.

44. Sacrum.
45. Abdominal.
46. Spermatie.
47. Abdominal integument
48. Posterior circumflex.
49. Obturator.
50. Femoral.
51. Tibial.
52. Metatarsal.
53. Tarsal.
54. Plantar.
55. Hypogastric.
56. Ilio lumbar.
57. Caudal.
58. Muscular.
59. Obturator, muscular branches.
60. Obturator.
61. Internal pudic.
62. Vena cava vein.
63. Jugular vein.
65. Posterior vena cava vein.
66. Portal vein.
68. Divisions of portal vein.

BONES.

1. 1 prime to 13 prime, ribs.
1. Horns.
2. Frontal protuberance.
3. Frontal bone.
4. Temporal bone.
5. Zygomatic bone.
6. Lower maxillary.
7. Malar.
8. Cavity for eye.
9. Lacrymal.
10. Upper maxillary.
12. Nasal bone.
13. The eight incisors.
14. Six upper molars.
15. Six lower molars.
16. Occipital.
17. Atlas.
18. Axis.
- 19—23. Cervical vertebræ.
- 24—37. Dorsal vertebræ.

- 38—43. Lumbar vertebræ.
44. Sacrum.
- 45—64. Coccygeal vertebræ.
- 65—66. Pelvis.
67. Os pubis.
68. Ball and socket hip joint.
69. Sternum.
70. Scapula.
71. Shoulder joint.
72. Humerus.
73. Ulna.
74. Elbow joint.
75. Radius.
76. Cuneiform bone.
77. Polygonal bone.
78. Lunar.
79. Magnum.
80. Scaphoid.
81. Semi-lunar.
82. Sphenoid bones.
83. Metacarpal.
84. Sesamoid.
85. Pastern.
86. Coronet.
87. Navicular.
88. Hoof.
89. Femur.
90. Patella.
91. Stifle joint.
92. Tibia.
93. Hock joint.
94. Calcis.
95. Astragalus.
96. Scapho-cuboid.
- 97—98. Cuneiform bones.

DIGESTIVE APPARATUS.

1. Cerebellum.
2. Cerebrum.
3. Pons Varolii.
4. Medulla Oblongata.
5. Spinal Marrow.
- 6—6. Cervical vertebræ.
- 7—7. Dorsal vertebræ.
- 8—8. Lumbar vertebræ.

- | | |
|---|---|
| <ul style="list-style-type: none">9. Sacrum.10—10 Coccygeal.11. Ligamentum nuchæ.12. Turbinated bones.13. Pharynx.14. Glottis.15. Thyroid gland.16. Palate.17. Mouth with six molars.18. Tongue.19. Bronchi and divisions.20. Left auricle.21. Right auricle.22. Right ventricle, interior.23. Aorta.24. Left ventricle, interior.25. Right ventricle, exterior.26. Left ventricle, exterior.27. Diaphragm, tendinous portion.28. Diaphragm, muscular portion.29. Gall-bladder.30. Bile duct of gall-bladder.31—33. Lobes of the Liver.34—35. Bile ducts of liver.36. Posterior, vena cava, entrance.37. Portal vein, opening.39—40. Ureter, ducts from kidneys.41. Vagina.42. Bladder. | <ul style="list-style-type: none">43. Opening of urethra.45. Uterus.46. Abdominal cavity.50. Milk collecting ducts.51. Milk-sinus.52. Duct of teat.53. Neck of uterus.54. Mouth of uterus.55. Umbilical cord.56. Young in position before birth.57. Cotyledons.58. Illium.59. Duodenum.60. Pylorus.61. Fold of fourth stomach.62. Leaves of second stomach.63. Meshes and cells of 2d stomach.64. Opening into second stomach.65. Opening of esophagus into the stomach.66. Supports of paunch.68. Front portion of paunch.69. Middle portion of paunch.70. Papillæ of paunch.71. Mesentery.72. Jejunum.73. Rectum.74. Anus.76. Colon. |
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MANIKIN OF
THE COW

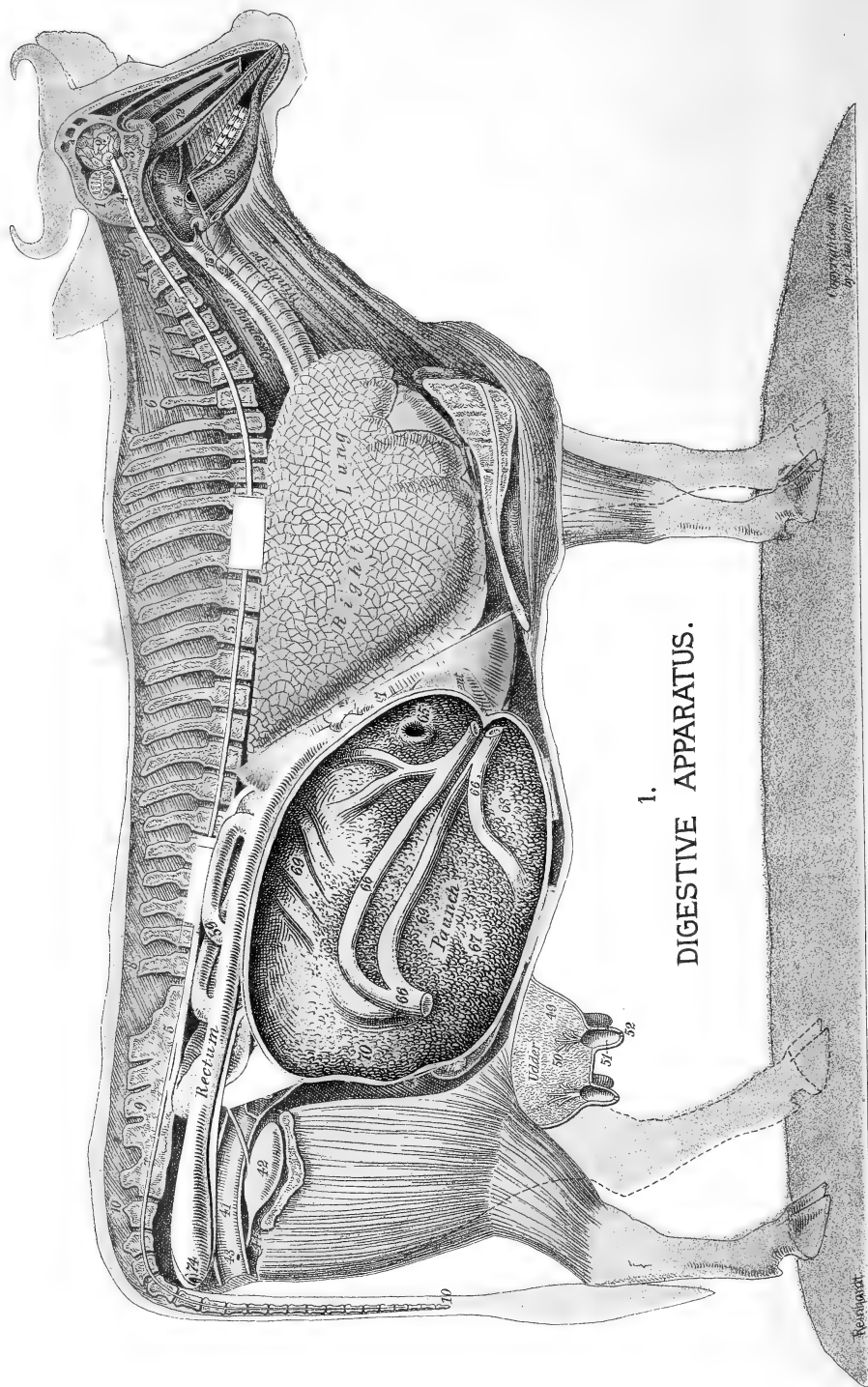
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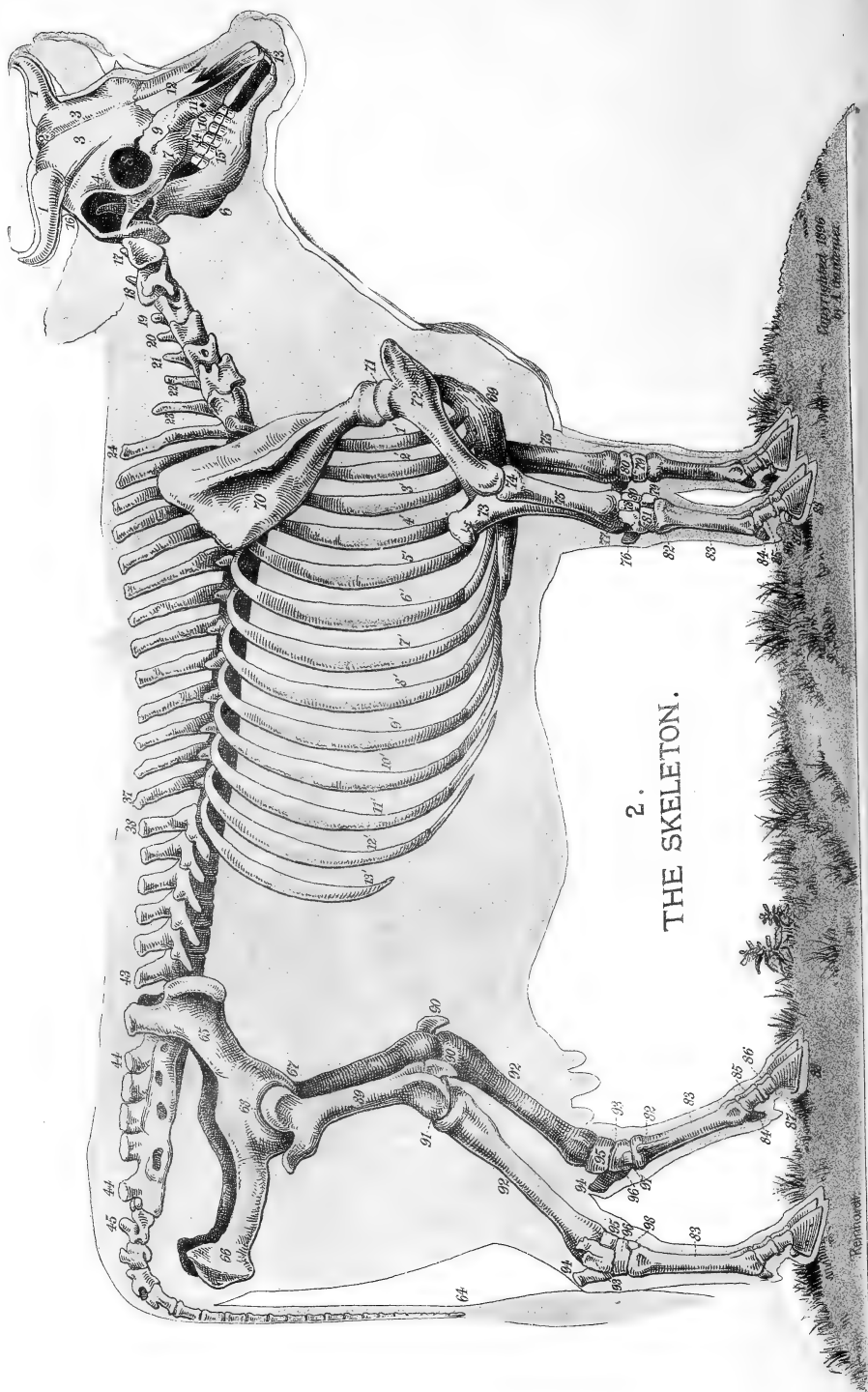
HAND-BOOK OF READY REFERENCE

BY

A. GARDENIER

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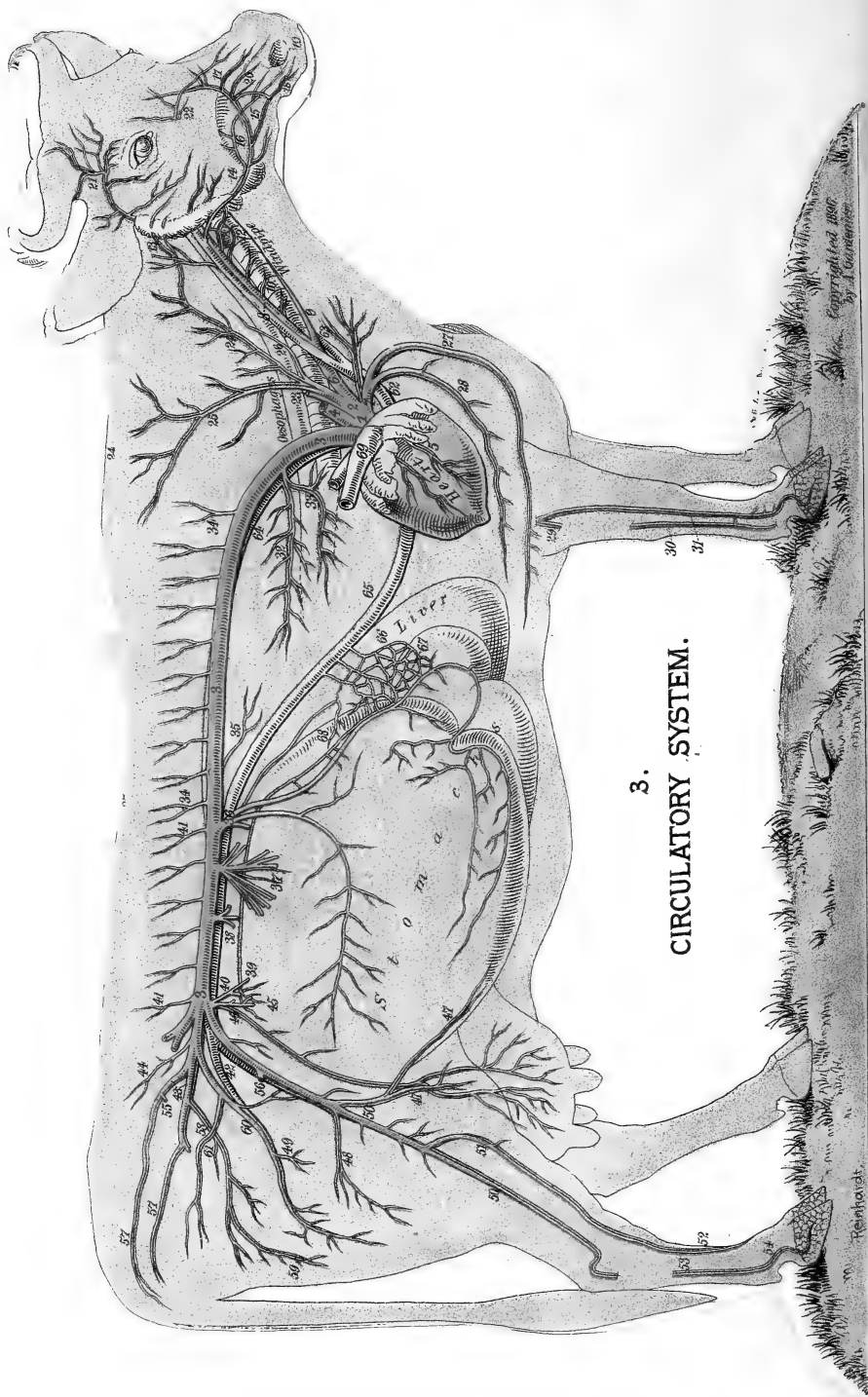




2.
THE SKELETON.

Engraved 1866
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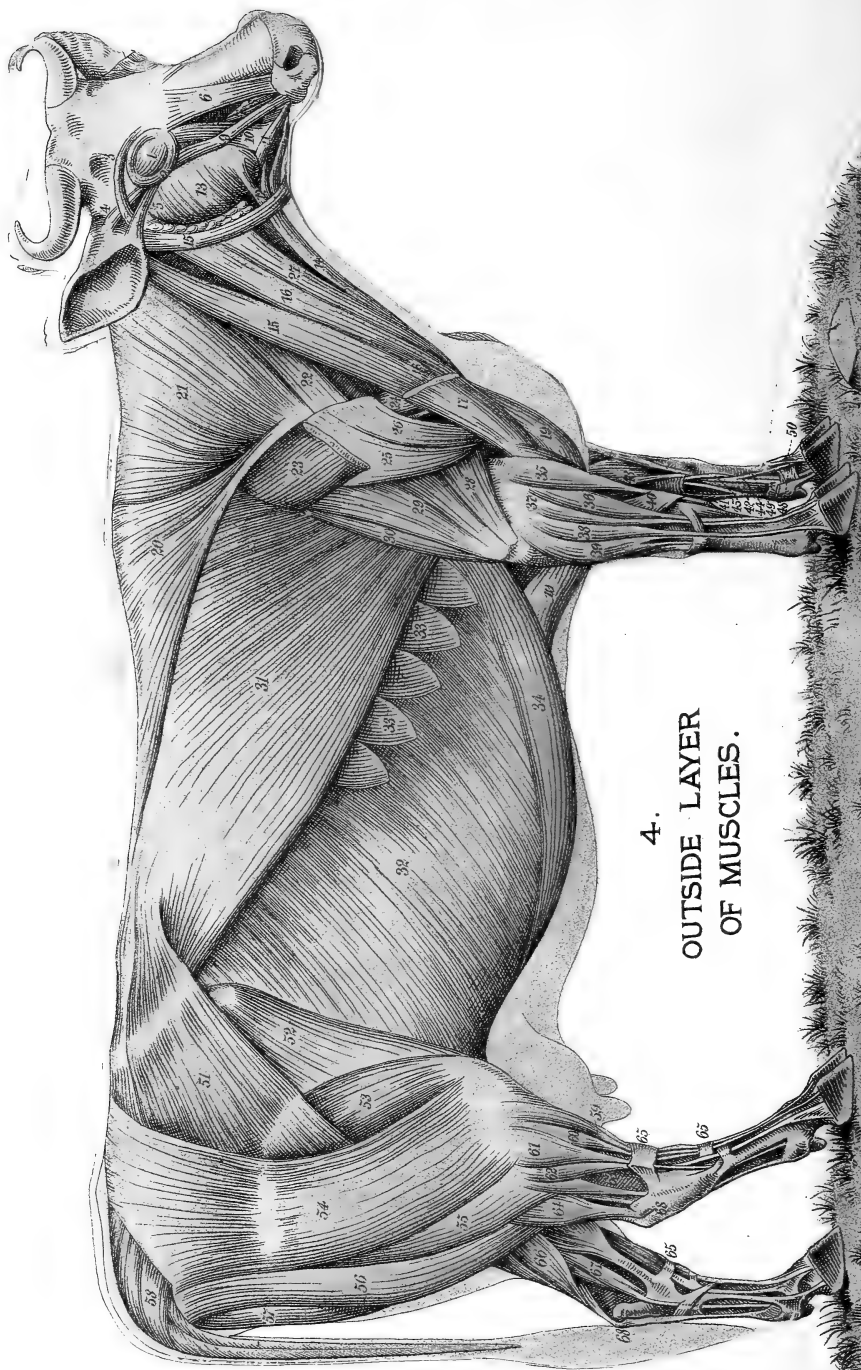
Reynolds



3.
CIRCULATORY SYSTEM.

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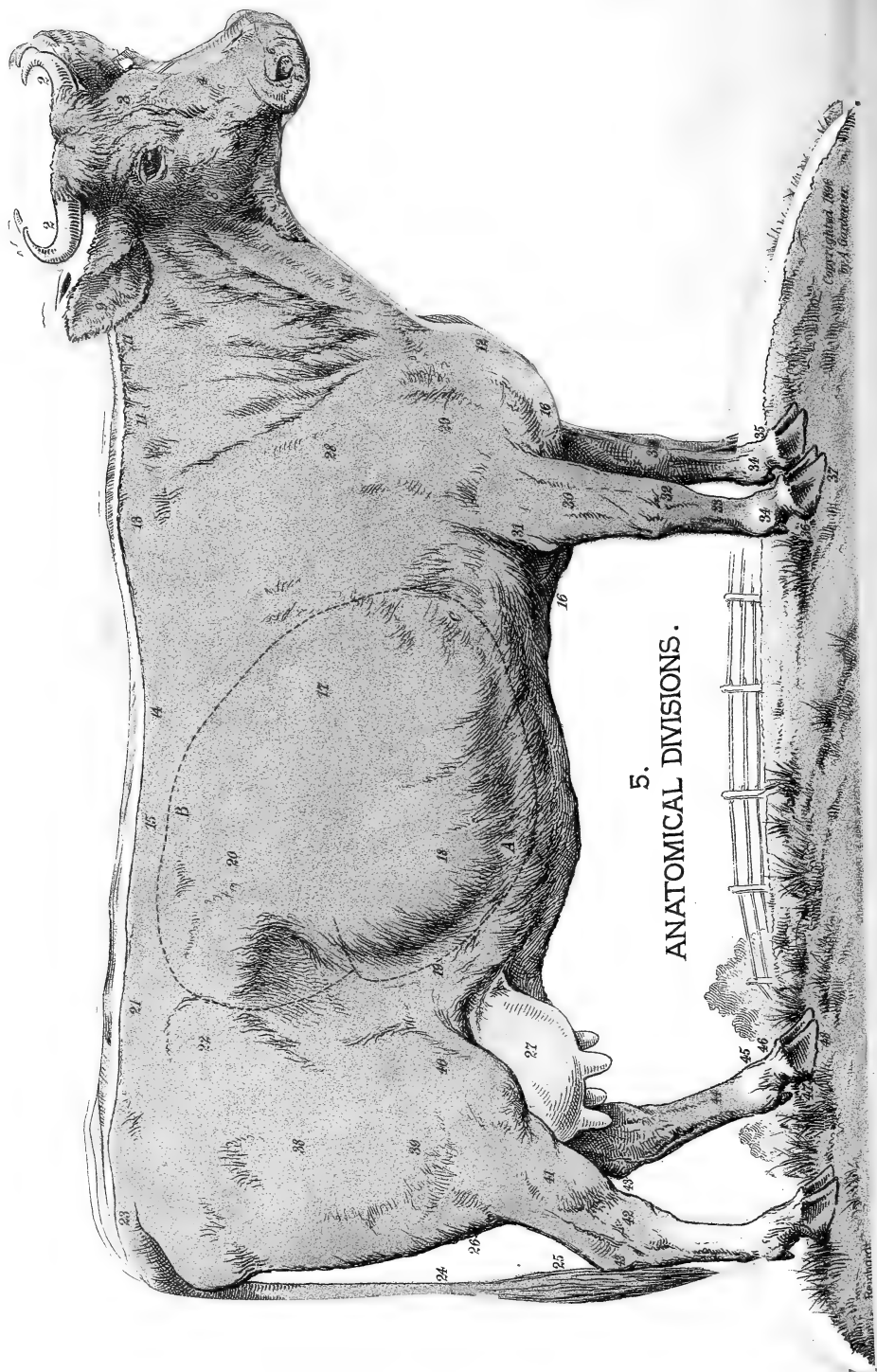
Reinhardt.



4.
OUTSIDE LAYER
OF MUSCLES.

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Remondin



CATTLE.

CHARACTERISTICS OF THE VARIOUS BREEDS.

Their Diseases and How To Cure Them.

DISCUSSIONS ON, SILOS AND ENSILAGE, THE USE OF
THE SEPARATOR, AND THE CARE OF MILK.

A DESCRIPTION OF AERATING MILK.

NEAT cattle have been the useful and cherished companions of mankind from the earliest date of history. The great regard and esteem the ancients had for this useful animal is shown by the fact that Moses on his return from Mt. Sinai found the Israelite wanderers worshipping a golden calf. The Egyptians worshipped an ox, Apis, the magnificent tomb of which has been recently discovered. Job, in his days of prosperity, was the owner of one thousand yokes of oxen. Homer, who lived eighteen hundred years before the Christian era, wrote of the noble bullocks with "golden knobs on the tips of their horns.

In the modern world there has been great improvement in the distinctive characteristics of cattle. By gradual and natural progress each nation throughout western Europe has developed a grade of cattle distinctly its own. The Moors of Spain raised cattle from which descended the savage and headstrong bulls used in the arena of bull-fights and picadores. The islands south of England have produced the Jerseys, the Alderneys, and the Guernseys, while Holland has given us the large, noble Holstein or Dutch cattle, and England has produced for her beef-loving lords the Durhams.

The North American continent, from the Atlantic on the east to the Pacific on the west, and from the great lakes on the north to the Gulf of Mexico on the south, with its vast low-lands, prairies, and mountain regions, furnishes a diversified climate, each section fitted for some breed of cattle, with characteristics specially suited for its climate.

The various soils and elevations of America furnish choice foods, and to be successful in cattle raising it is only necessary to choose varieties of cattle best adapted to the positions they are to occupy, and the uses demanded of them. In selecting a herd for profit, there is to be considered, whether beef, butter, cheese, or milk is to be the production, and then to select from the various herds that are best adapted for the desired product, that variety that will do best in the climate and on the kind of food the easiest and cheapest to produce.

The Short-Horns. It is asserted by historians that the Danes introduced cattle into Northumbria, Durham, and York, the north-eastern counties of England, long before William the Norman conquered the Heptarchy. Southern Denmark, Jutland, and Holstein, possessed a breed of cattle, that the Danes shipped to England in exchange for other products raised on the Isle of Great Britain. It is supposed by the majority of writers on early English agriculture and cattle, that the short-horns are descendants of the cattle so introduced, and that for several centuries they inhabited only the most eastern part of England.

In the agricultural progress of the country, these cattle received much attention, and they improved much in form, flesh, and general appearance. The animals were coarse in form and flesh, but they possessed great aptitude to fatten, and within their high, broad carcasses were elements that caused them to improve when brought under careful management and given shelter, and good food.

These animals had improved by the year 1740, so that a Mr. Millbank, of Barningham, dressed a five year old ox that weighed two thousand one hundred pounds in the four quarters, and had besides, two hundred twenty-four pounds of rough tallow; and a cow of the same stock, which weighed fifteen hundred forty pounds. These weights are recorded and it will be noticed that they nearly equal those of the present time.

The improvement of the English short-horn has gone on, until now, as a producer of beef, they stand in the front ranks of all the bovine races in Great Britain, and also in portions of the adjacent continent,

and in the English colonies of Australia and Canada, where the soil and climate are peculiarly adapted to their support. They are the heaviest beef cattle that are received into the London markets and they mature at an early age. It is claimed that they excel when bred for milkers, but we believe this is not supported by any authority other than the statements of the short-horn breeders and speculators.

The introduction of the short-horns into America seems to be shadowed in mystery. Either those who brought this class of cattle into the country before the Revolution did not deem the fact of sufficient importance for record, or there were none introduced for the first authentic record dates back only to their introduction by a Mr. Miller into Virginia just after the close of the war. In 1797 a few of the descendants were taken into Kentucky. Various importations were made through the first half of the eighteenth century, until in 1856 America had as fine a bred stock of short-horns as could be found in England itself.

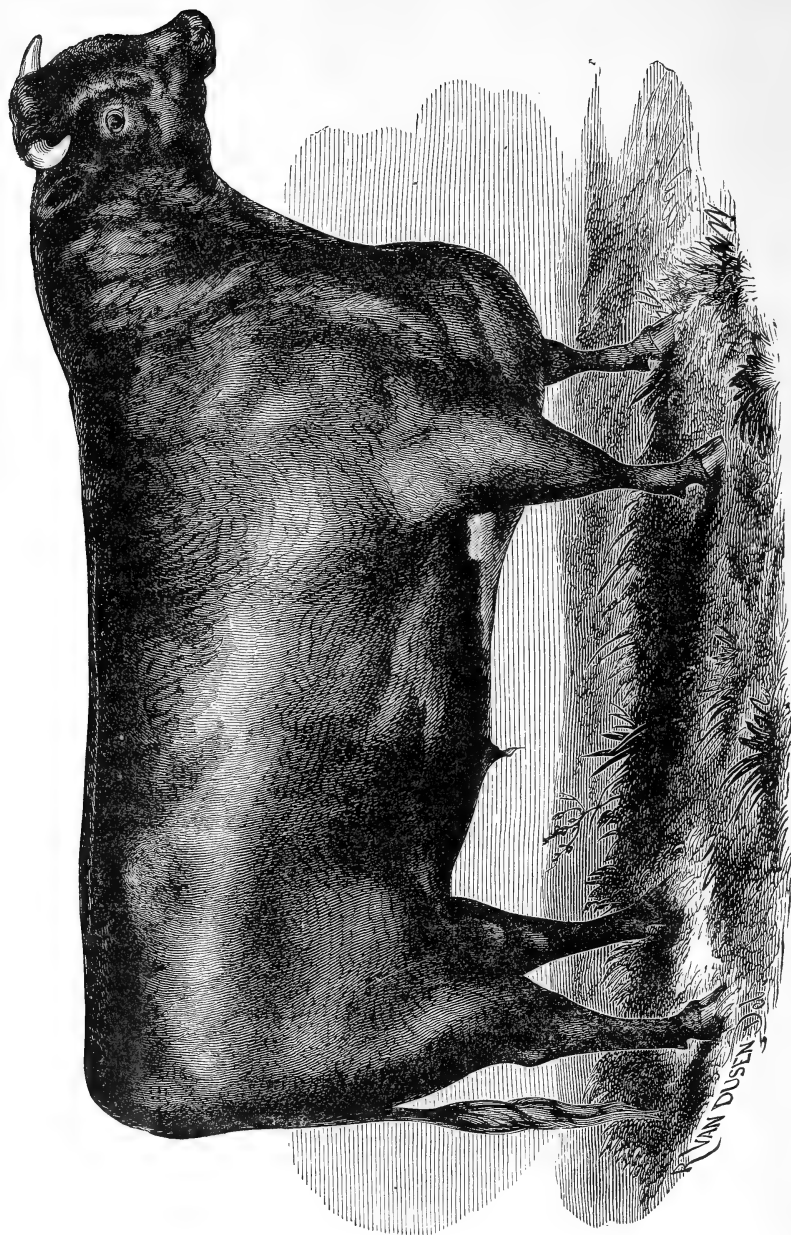
The English Herd Book commenced in the year 1822, while the American Herd Book commenced in 1846. These books contain the records of over ninety thousand bulls and cows. This breed of cattle extends over a greater territory in the United States than any other foreign breed.

Characteristics. There are two classes of short-horns, one classed as flesh-producing, the other as dairy.

The class of short-horns that are noted for their flesh-producing qualities are those that have yielded to their natural tendency of taking on flesh. Because of this predisposition the English breeders began to breed for the production of flesh. They gave abundant food from early calf-hood till fully matured. Thus these animals grew rapidly, matured early, and had great rotundity of body. The English breeders were encouraged in their production of this class of animals on account of the demand of the markets for beef, and the great desire of the breeders for cattle of this class for importation.

The modern short-horn breeders in America appear to care but little for the production of milk, so that the flesh-producing class has been brought to greater perfection in this country than the dairy class.

The early importations of short-horns into the United States were those chiefly for milking purposes, and agricultural publications of fifty years ago record remarkable yields of milk and butter. But the short-horns are naturally beef-producers and will succeed best as such. Nature leads toward beef-production and the efforts of the breeders have been



SHORT-HORN BULL.

largely in that direction. Exorbitant prices were paid for years for good specimens of this class of stock for special importation into America.

A first-class short-horn has a head with a fine yellowish, nut-brown, or black muzzle; broad forehead; full, bright eyes; lean cheeks; concave or dishing face; short horns, standing wide, gracefully spreading out at the base, and then turning upward with a still further spread. The horns show no black except at the tips. The ear is of a moderate size, thin, and moves with a quick motion, and the throat is clean, without dewlap. The neck sets well into the shoulders and breast, and with a slight pendulous hanging of the skin, just at the brisket. The shoulders are full and wide at the tops and nearly straight; the shoulder points are full and wide; the brisket projects well forward, and is broad and low; the arm tapers to the knee; and the leg has a fine bone ending in a well rounded foot. The ribs are full and round, and run back well towards the hips; the loins are full and level; the rumps long and wide; the tail set on a level with the back, and is small and tapering; the thighs full and heavily fleshed; the twist wide; the flank low and full; and the hock or gambrel joint, standing straight, or nearly so.

Colors. The well bred short-horn varies in color from a pure white to a deep red, and intermixtures of these colors which produce the light roan, with white predominating over the red; the red roan, with the red more prominent than the white; and red or white mixed or spotted in every conceivable manner. Some breeders think that short-horns of pure white are less hardy than the reds, but statistics do not bear them out in their prejudices.

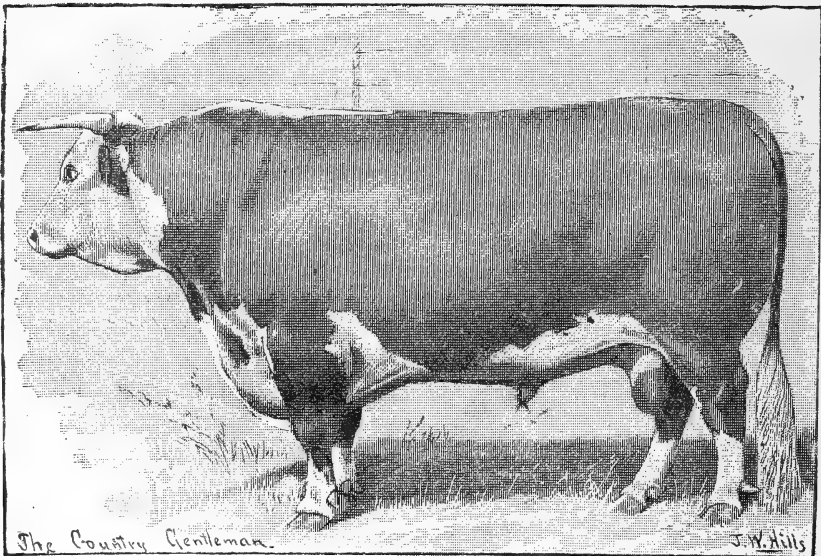
Flesh. As a beef animal they are superior in producing large quantities of beef, but it is not so tender and juicy, nor of so fine a grain as found in the Devons, the Galloways, or the Highlands.

Climate Adapted to the Short-Horns. Experience has shown that the short-horns will thrive well in cold climates, even doing well as far north as 45° of latitude, (on a line with the northern boundary of New York State). Of course in the colder latitudes the cattle must have good protection in winter. It is soil and feeding that makes the animal thrive, and with shelter in inclement weather, and a fairly temperate climate good results may be expected.

This breed of animals while profitable in the beef producing portions of America, are being superseded by the milk producers in the east. Beef can be shipped long distances to market, but milk should be produced

near enough to the market, that it may be received and placed on sale at least within ten or twelve hours after milking. Therefore the short-horns will be found most profitable at such distances from our great cities that it is impossible to ship milk profitably to their markets.

The Herefords. This is a valuable herd of cattle, although but comparatively little known in America. The Herefords are named after a county in south-western England which is adjacent to Wales. These cattle are of very ancient ancestry, but have been very much improved within the last century.



HEREFORD BULL, "LEATHER STOCKING."

The color of this breed has a peculiar history as to its changes and markings. One hundred years ago they were deep red—almost brown, in color; now they are usually red, with white faces, throats, bellies, and sometimes backs. About the time of King John of England (A.D. 1200) they were all white with red ears, and Maude de Brehos, against whose husband King John was highly incensed, in order to soften the wrath of the mighty king and thereby saving the life of her husband, presented to the queen, the wife of King John, four hundred cows and one bull, all white with red ears.

bone and horn, a trifle shorter leg and longer body, a little coarser in every part, and you have a good Hereford in all excepting color.

“As useful cattle the Herefords are a good breed. We are aware that their introduction into the United States has not been, in comparison with some other breeds, successful in popularity or extended distribution; but that fact decides nothing as to the positive merits of the stock itself. Partiality, prejudice on the part of our cattle breeders, or pre-occupation of the ground by other breeds which meet the general approbation, may keep them for a time in the background; but their actual merits once known, they will have a fair trial and achieve a substantial success.

“Like the Devon, we place the Hereford under three distinct heads; and first,

As a Dairy Cow. In this virtue she has little reputation, either in England or America. We have found no English authority, except a rare instance or two, which gives her much credit as a milker. Possibly this may have arisen from the fact that the Hereford districts are grazing, and not dairy. The milk is rich, but too little of it—not much more than to rear her calf in good condition. She dries early.

“If she ever was a milker before her modern improvement began, the milking faculty has been sacrificed for a ready tendency to flesh, which has been obtained in a high degree in her race. We have seen a dozen of them milked through three or four successive seasons, and the yields were such as would be unsatisfactory to a modern dairyman. Now and then a fair milker turned up, but they were in a minority of numbers; taken together they were less than ordinary for the season. We will not therefore discuss this question further, but pass to another quality as yielding greater pleasure in the relation.

As a Working Ox, “The Hereford is the peer of any other and superior to most. Large, long, muscular, well developed in form, noble and stately in carriage, he suggests all that need be found in an honest, true worker. At full maturity—say six years old—he girts seven feet behind the shoulders, in ordinary condition, to the Devon’s six feet, and is every way the more powerful, if not quite so quick or active. A team of two, three, or four yokes of Herefords, under the control of a good driver, for ‘a long pull, a strong pull, and a pull altogether,’ is the perfection of bovine strength and majesty. The joints of the ox are well knit, his sinews strong, his shoulders slant well to the yoke, and he carries his load well, be it at the plow, the cart, or the wagon. He is

kindly, intelligent, honest in his labor. We have seen them from half to three-quarters blood, crossed from the common cow, and up to thorough bred, all of great excellence as draught beasts, well matched, and admirable in all their points. The Hereford blood is strong in marking its descent. From the bulls which were kept in our neighborhood eighteen years ago, crossed upon cows which run on the adjacent commons, in their summer pasturage, we now, in their progeny, to later generations, frequently see cows and oxen but a quarter, an eighth, or sixteenth in blood—got by scrub bulls—that show strong Hereford marks in form and color.

“Where hay and pasturage are cheap, and the farmer has a taste for the business, it must be a profitable investment to obtain a thorough bred Hereford bull, cross him on well selected native red cows, and rear and break steers for the markets where good working oxen are in demand. The strong blood of the bull will give uniformity in shape and color, so that the steers may be easily matched, and if not wanted for the yoke, they are equally valuable, as other cattle, for feeding and the shambles.

As a Beef Animal, “The Hereford is superior. They feed kindly, are thrifty in growth, mature early—at three and four years old—and prove well on the butchers’ block. We are aware that they have not now a general popularity in the great cattle breeding regions of our Western states. Few of them have been introduced there, and those, perhaps, not in the right hands to push them to the best advantage. We could wish for them a fairer trial; but the prejudice against the cows as milkers, and the lack in their taking appearance as a highly distinctive race, in comparison with the more taking shorthorns, have kept them back in public demand. Their time has not yet come; and it may be, that in the right hands, and with a more critical observation among our cattle breeders and graziers, they may achieve a reputation as a grazing beast, equal to some now considered their superiors.

“In their native counties in England, they still hold a high rank, and at the prize shows in the London markets compete successfully with other improved breeds. With all the deficiencies which the advocates of other breeds allege against them, the Herefords still maintain their reputation among the English breeders, who hold on to them with a pertinacity which shows an unabated confidence in their merits and profit as a true grazier’s beast. We might show recorded tables of their trials, in England, with shorthorns, and the relative profits of their feed-

ing for market, in which the Herefords gained an advantage on the score of economy; but as the trials were not from birth to slaughter, and the comparative early advantage of each breed were omitted in the account, a repetition of the tables here would not be conclusive.

Herefords in America. " Within the past twenty years numerous importations of good Hereford cattle have been made into both the United States and Canada, and scattered chiefly into the Western States and Territories for crossing on the native cows and rougher Texan ones



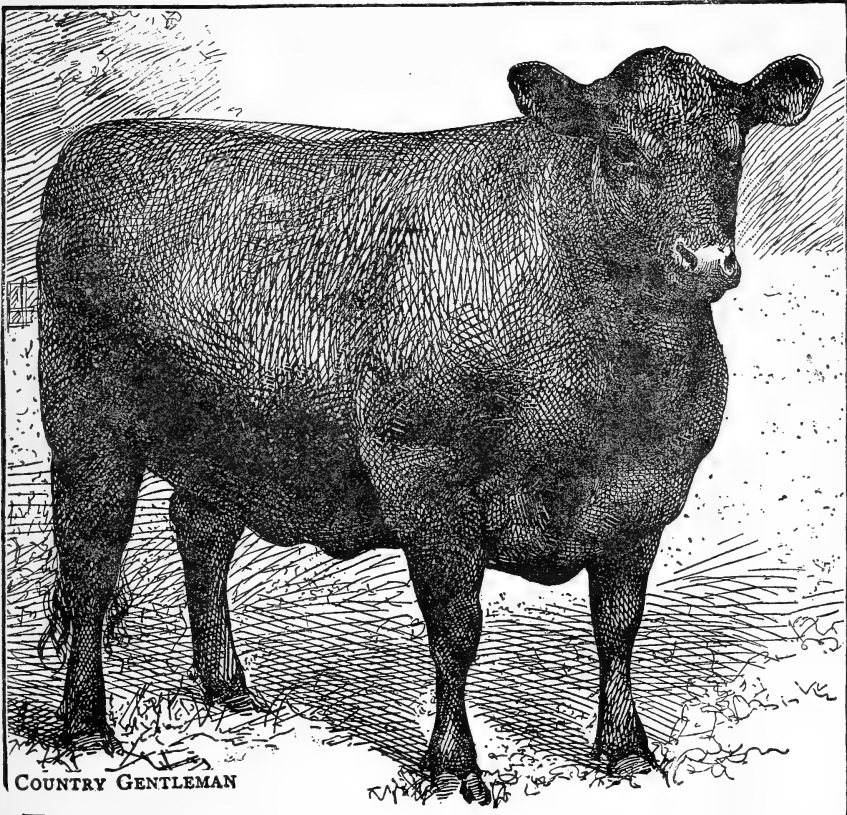
ABERDEEN-ANGUS BULL, "LINDOLPH."

for beef raising, as well as breeding in their pure blood. They command ready sales and good prices, are rapidly rising in public favor and will add largely to the better qualities of beef production. They have a Herd Book record of their own, and may be counted as having taken an established position in the broad grazing districts of the country.

" It is doubtful whether in early maturity for the shambles they will equal the short-horns, now so universally prevalent, but as they are active in movement, may better suit some localities where the lymphatic

temperament of the short-horns will not so well enable them to range over wide distances to gather their forage. Taken altogether the Herefords are a good breed of cattle, and will undoubtedly maintain a high position among our bovine varieties."

Aberdeen-Angus. The native polled cattle of Aberdeen and Angus have early development of rapidly fattening properties. There



ABERDEEN-ANGUS, BLACK HEIFER, "EMPRESS," WEIGHT 1600.

SWEEPSTAKES AT FAT-STOCK SHOW, BIRMINGHAM, ENGLAND.

were originally two classes, one large and another small. The small were rather puny creatures, always thin in flesh, and were very badly used. Of the larger kind about one-half were jet black, excepting the udder, which was usually white and often the whole underline was

white. They could not stand starvation like the small polls, and with a better treatment they gave a heavier yield of milk.

There is no record of any systematic combination of the two races, but as the stock raisers of those days saw no special advantage in keeping any herd absolutely pure from generation to generation, the natural conclusion is that their blood was more or less intermingled.

Formerly, in Aberdeen and Angus the breed embraced a variety of colors as well as the difference in size. Some were brindled (dark red and black stripes alternately); others were red; some brown; and a few "silver-colored yellow." But systematic breeding has relegated to the back ground all shades of color, excepting the black.

These cattle, as now found, are large, scarcely inferior in weight to any in the country. At a casual glance they seem smaller than the average shorthorn, but when the lever of the scale is examined the difference is less than what at first sight it was thought to be, and oftentimes the lever causes all differences to disappear.

The Aberdeen-Angus cattle are lengthy, deep, wide, even porportionate, and very cylindrical. The head of the polled male is not large and is handsome, and it is neatly set on the neck; the muzzle is fine; the nostrils wide; the eyes mild, large, and expressive; the poll high; the ears of fair size, lively, and well covered with hair; the throat clean, with no development of skin and flesh beneath the jaws, which are not heavy; the neck quite long, clean and rising from the head to the shoulder-top and surmounted by a crest.

In the Paris Exhibition it carried off every single honor for which it was entitled to compete, and in the British show yards, both fat stock and breeding, it has attained a leading position. In a strictly butcher's point of view, it has very seldom to yield to any other race of cattle.

Its superiority over other herds, for the butcher's purpose, lies mainly in the excellent quality of beef, and in the high percentage of dead meat to live meat. The carcass is usually lined with fat of the finest quality, while in the density and quality of the carcass itself this breed can easily claim first place. Some place the small Devon breed alongside if not even with the Aberdeen-Angus, but that is the only breed that will yield so large a percentage of dead meat to live weight.

This breed is specially adapted for crossing with short-horns. Indeed the very best beef-producing animal in the world is a cross between a short-horn bull and a polled Aberdeen-Angus cow.

The Galloways. The cattle that are now known as the Aberdeen-Angus were originally quite universally called the Galloways. They, according to many authorities, originated in the Lowlands in the extreme south-eastern part of Scotland, taking their name from the ancient kingdom or province of Galloway. They have for many years been bred and improved in Aberdeen and Angus, and have gradually taken unto themselves a "new name."

The Devons. This race of cattle is divided into two classes, and are called in England, North Devons and South Devons. The South Devons are somewhat larger, coarser, and less thought of than are the North Devons. Our description shall be confined to the North Devons as they are the ones that have been most largely introduced into America.

Some authors claim that this breed of cattle were known in England at the time of the invasion of Cæsar, 55 B. C. They have characteristics that have never been produced by any other breed or by the intermixture of any other breeds. This would seem to prove that they date far back to an ancestry, unlike any of the other strains of blood.

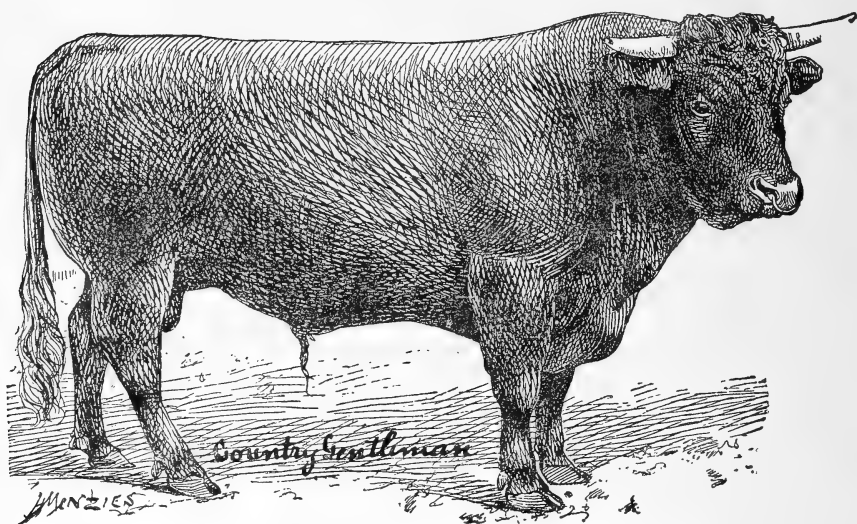
They have been the object of careful breeding for centuries, and during the past century no grade of cattle has received greater attention.

They bear the distinction of being the only breed of cattle in which it is impossible to detect infusion of the blood of other breeds. Efforts have been made to improve them "as Devons" but as yet no foreign blood has been found that adds to their excellence or beauty. Their breeders for centuries have been men of rare judgment and sagacity, and have been very painstaking, and to this fact must be attributed their purity of blood and great perfection.

The Devons are of medium size. A full grown ox will tip the scales between fourteen and sixteen hundred. The bulls will weigh from ten to twelve hundred, while the average cow will weigh about nine hundred. When fattened, they of course will weigh considerably more, these weights being the average weight for animals in ordinary condition.

Description. The Devons have a head that is rather short, with a slightly dishing face, that gracefully tapers toward a fine, clean, yellow muzzle. Their eyes, which are surrounded by a ring of yellow or orange colored skin, are bright and prominent. Their horns which are cream colored with black tips, may be considered as rather long for the size of the animal, but they are graceful in their setting. The ears

are lively in action and well set. Their necks are clean and without dewlaps, and are on a level with the head and shoulders. Their fine, open, shoulders are on a level with the back, and slant somewhat like the shoulders of a horse. Their neck-veins are smooth and full, and their full briskets project well forward. Their arms are delicate and the legs below the knees are small and terminate in a brown and somewhat striped hoof. Their backs are straight from the shoulders to the root of the tail. Their ribs form the framework of a full chest and as they set well back toward the hips, they give the belly a snug and neat



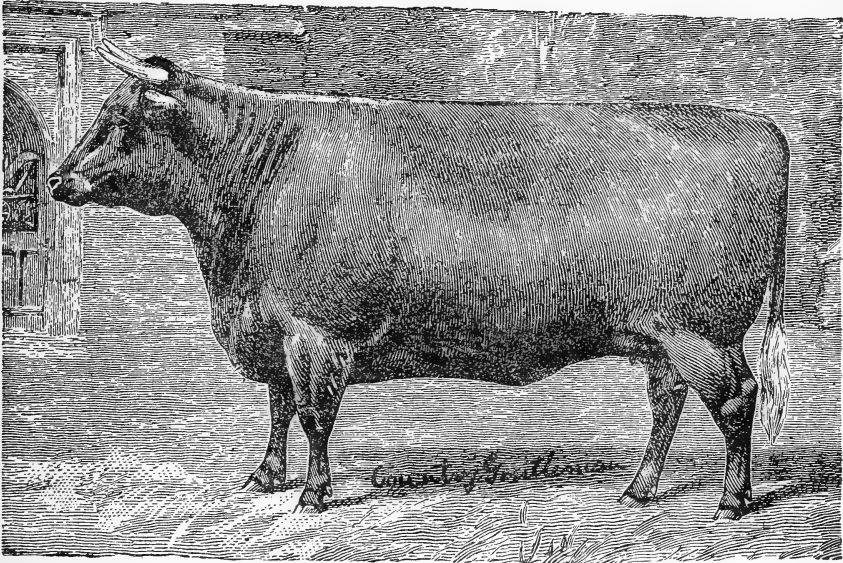
ENGLISH DEVON BULL.

appearance. Their hips are wide and on a level with the back. They have full loins and their thighs are well fleshed, the lower part thin and tapering toward the hock. The space between the thighs is well let down and open. Their tails are tapering and end with a brush of white hair. They are invariably of a cherry red, and the skin under the hair is of a rich cream color. The hair is silky and lays in waves over most of the body.

As a Beef Animal. For the fineness of its flesh and the delicacy of its flavor, the Devon is not surpassed by any variety of cattle. In growth and size it matures nearly as soon as the famous short-horn, and yields under good feeding nicely marbled, (lean and fat intermixed), fine

grained, juicy meat. They are good feeders, fatten quickly, and the quality of their flesh is such that American butchers always prefer the Downs for their market.

They are not large animals, but their flesh is laid on in the choicest parts. In America their small size seems to be their great objection, hence the animal is not largely bred. They would prove profitable in hilly and mountainous sections, where the large, heavy cattle find it difficult to gather the grasses.



DEVON HEIFER, "JENNY," 10562.

As a Dairy Animal. The Devon does not give a large amount of milk, but the quality is first-class, yielding per gallon almost as much butter as the Jersey. Originally they perhaps produced more milk than they do at the present time, for the breeders of this valuable breed of cattle worked toward a finer form, and heavier carcass, or the best beef laid on in the most profitable parts. She is fairly well fitted for a dairy cow, if bred in that direction, for she is easy to keep, has a good disposition, and is easily managed. Her udder is small, soft and tidy, and is well covered with silky hair, and her clean, tapering teats are easily drawn.

As a Working Ox. "For his inches" there is no other horned beast that can draw so heavy a load. He is not so large as the Herefords and many other cattle, but his great strength, moderate size and activity makes him of special value on light, sandy soils, and on hilly roads. On the road and at the plow they are equal to the ordinary duties, and they will cover a mile or turn a long furrow quicker than the slow walking, heavier breeds.

The Ayrshires. Ayrshire is the finest dairy county in Scotland, and extends along the Firth of Clyde and the North Channel. This is the former home of the Ayrshire cattle, but how they originated is a matter of dispute; all that is certainly known about this now valuable breed is that in 1730 there was no such breed in Ayrshire, or in that vicinity. But we leave its origin to be fought over by historians, knowing that even if able to trace out its ancestry it would not add any qualities nor enhance its value as a milk cow.

As a Dairy Cow. Mr. Aiton, who is considered the best of authority on the Ayrshires, has the following to say regarding their qualities as a dairy animal :

"The excellency of a dairy cow is estimated by the quantity and the quality of her milk. The quantity yielded by the Ayrshire cow is, considering her size, very great. Five gallons daily, for two or three months after calving, may be considered as not more than an average quantity. Three gallons daily will be given for the next three months, and one gallon and a half during the succeeding four months. This would amount to more than eight hundred fifty gallons; but, allowing for some unproductive cows, six hundred gallons per year may be considered as the average quantity obtained annually from each cow.

The quality of the milk is estimated by the quantity of butter or cheese that it will yield. Three gallons and a half of this milk will yield about a pound and a half avoirdupois, of butter. An Ayrshire cow may be reckoned to yield two hundred fifty-seven English pounds per annum, or about five pounds per week all the year round, beside the value of the butter-milk and her calf.

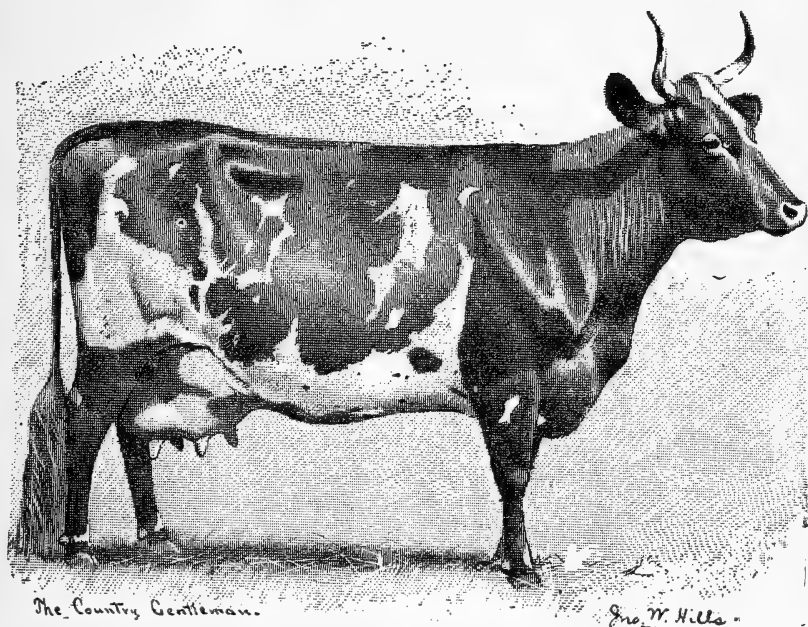
When the calculation is formed, according to the quantity of cheese that is usually produced, the following will be the result: twenty-eight gallons of milk, with the cream, will yield twenty-four pounds of sweet-milk cheese, or five hundred fourteen pounds avoirdupois per annum, beside the whey and the calf.

This is certainly an extraordinary quantity of butter and cheese, and

fully establishes the reputation of the Ayrshire cow, so far as the dairy is concerned."

As a Beef Animal. Mr. Rankin, a high authority, who thoroughly tested the Ayrshires on his own farm, the soil of which was of an inferior quality, has this to say regarding the Ayrshires as beef cattle :

"The fattening properties of the Ayrshire cattle we believe to be a little exaggerated. They will feed kindly and profitably, and their meat

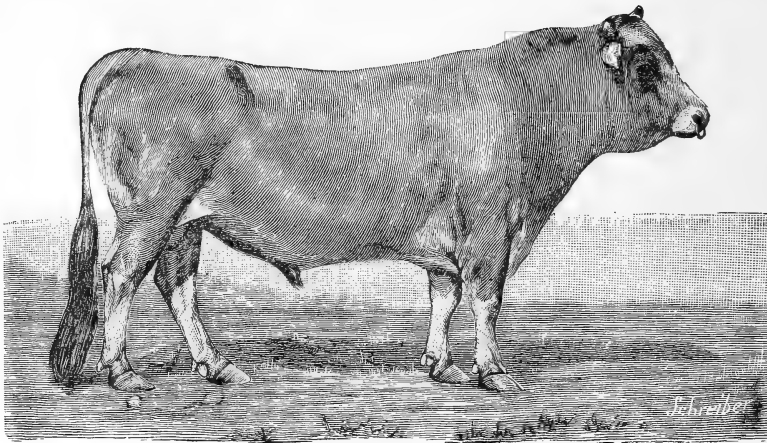


AYRSHIRE COW, "DELLA PENDER."

will be good. They will fatten on farms and in districts where others could not be made to thrive at all, except partly or principally supported by artificial food. They unite, perhaps, to a greater degree than any other breed, the supposed incompatible properties of yielding a great deal of milk and beef.

On their natural food, of poor quality, they give milk abundantly and long, and often until within a few days of calving. In their own country, a cow of a fleshy make, and which seldom proves a good milker, may be easily raised from five hundred sixty to seven hundred pounds,

and bullocks of three years old are brought to weigh from seven hundred to eight hundred forty pounds. There is a lurking tendency to fatten about them, which good pasture will bring to light; so that when the Ayrshire cow is sent to England she loses her superiority as a milker, and begins to accumulate flesh. On this account it is that the English dealers who purchase the Ayrshire cows, generally select the coarsest animals they can find, in order to avoid the consequence of the change of climate and food. It is useless to exaggerate the qualities of any cattle, and it cannot be denied that even in this tendency to fatten when their milk begins to fail, or which often causes it to fail, the Ayrshires must yield to their forefathers, the Highlanders, and also to their neighbors, the Galloways, when put on a poor soil; and they will be left con-



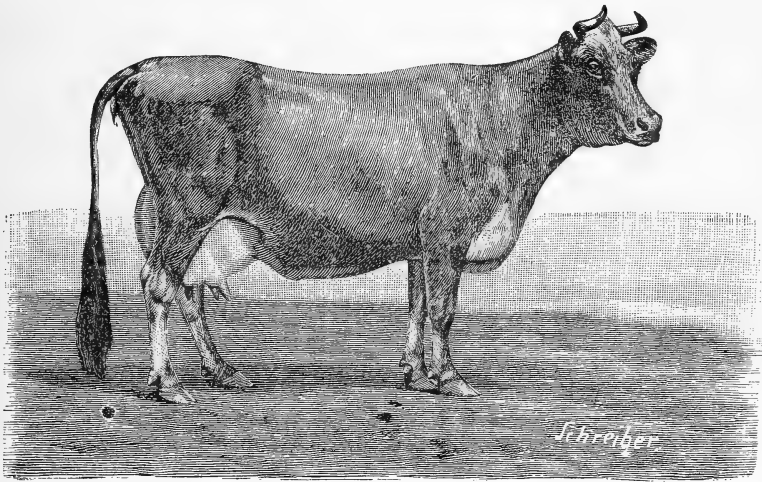
JERSEY BULL.

siderably behind their short-horn sires, when transplanted to luxuriant pastures. It will be long, perhaps, before they will be favorites with the butchers, for the fifth quarter, (the tallow), will not usually weigh well in them. Their fat is mingled with the flesh, rather than separated in the form of tallow; yet this would give a more beautiful appearance to the meat, and should enhance its price to the consumer."

Description. The shape of the Ayrshire cattle most approved are as follows:

The head—small, but rather long and narrow at the muzzle; the eye—small, but smart and lively; the horns—small, clear, crooked, and

their roots at considerable distance from each other; the neck—long and slender, tapering towards the head, with no loose skin below; the shoulders—thin; the fore-quarters—light; the hind-quarters—large; the back—straight, broad behind, the joints rather loose and open; the carcass—deep, and pelvis capacious, and wide over the hips, with round fleshy buttocks; the tail—long and small; the legs—small and short, with firm joints; the udder—capacious, broad and square, stretching forward, and neither fleshy, low hung nor loose; the milk veins—large and prominent; the teats—short, all pointing outwards, and at considerable distance from each other; the skin—thin and loose; the hair—soft and woolly. The head, bones, horns, and all parts of least value, small; and the general figure compact and well proportioned.



JERSEY COW.

The Jerseys. Just off the coast of Normandy, in the British Channel, are the small islands, Jersey, Guernsey, and Alderney, each noted for its own breed of cattle. While these islands are in close proximity to each other and the cattle have a general likeness to each other, there is still enough difference in them to make each a distinctive breed.

These breeds are simply “milking” breeds, and they should never be bred for any other purpose. The cows are prized for the marked richness and deep yellow color of their milk and their deep yellow butter. The Jerseys give only moderate quantities of milk, eight to sixteen

quarts per day, in the best of the season, but the milk is remarkably rich in cream and butter.

They have the power of imparting to the grades descending from them the Jersey quality and color of milk. Thus Jersey bulls can be used to advantage in crossing with common cows.

These breeds are now kept in many parts of the New England and Middle States, and their milk is preferred by the dealers to that of any other breed.

Under extraordinary stimulants of food and forcing, some Jersey cows are said to have produced enormous yields of butter, not only for a week, but for a whole season. A record, said to be authentic, shows nearly a half ton of butter in a single year. The Jerseys are thus described by Lewis F. Allen in "American Cattle:"

"Beginning with the head—the most characteristic feature—the muzzle is fine, the nose either dark brown or black, and occasionally a yellowish shade, with a peculiar mealy, light-colored hair, running up the face into a smoky hue, when it gradually takes the general color of the body: the face is slightly dishing, clean of flesh, mild and gentle in expression; the eye clear and full, and encircled with a distinct ring of the color of the nose; the forehead bold; the horn short, curving inward, and waxy in color, with black tips; the ear sizable, thin, and quick in movement. The whole head is original, and blood-like in appearance—more so than in any other of the cattle race—reminding one strongly of the head of our American elk. The neck is somewhat depressed—would be called "ewe-necked" by some—but clean in the throat, with moderate or little dewlap; the shoulders are thin and somewhat ragged, with prominent points running down to a delicate arm, and slender legs beneath; the fore-quarters stand rather close together, with a thinnish yet well developed brisket between; the ribs are flat, yet giving sufficient play for good lungs; the back depressed from a straight line; the belly deep and large; the hips tolerably wide; the rump and tail high, the loin and quarter medium in length, the thigh thin and deep; the twist wide, to accommodate a clean, good-sized udder; the flanks medium; the hocks, or gambrel joints, crooked; the hind legs small; the udder capacious, square, set well forward, and covered with soft, silky hair; the teats fine, standing well apart, and nicely tapering; the milk veins prominent. On the whole she is a homely, blood-like, gentle, useful little housekeeping body, with a most kindly temper, loving to be petted, and, like the pony with the children, readily becomes a great favorite with

those who have her about them, either in pasture, paddock, or stable. The colors are usually light red, or fawn, occasionally smoky grey, and sometimes black, mixed or plashed more or less with white. Roan colors, and a more rounded form, are now and then seen among them, but are not much fancied."

The Guernseys. This breed is very much like the Jerseys in form and characteristics, but they are about one-third larger, somewhat rounder and symmetrical, and produce a larger quantity of milk. They have a superior tendency to flesh and as good dairy qualities as the Jerseys. They are being largely introduced in our country, and they are highly prized by those who have adopted them for dairy purposes.

Red Polls. These cattle have for many years been extensively bred and used for both dairy and beef production, in the county of Norfolk, in England, and have been known for many years as Norfolk Polled Cattle.

There were hornless cattle in Suffolk County which adjoins Norfolk, but these cattle, like those of Norfolk, originally were of all shades of color. The breeders of both counties succeeded after nearly a half a century of careful attention in giving them uniformity of color, but those of Suffolk bred toward a "dun" color and these cattle for years were known as "Suffolk Duns;" while the breeders of Norfolk bred towards a handsome red, and these are to-day the "Red Polls."

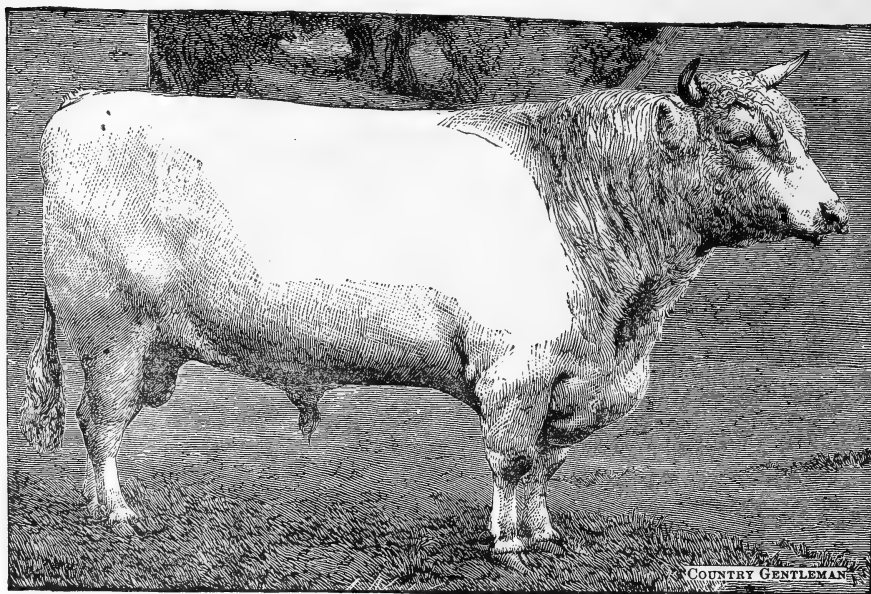
The Red Polls are of medium size, and are a very handsome red. They are hardy and thrifty; fatten easily; mature early; very quiet disposition; easily handled; good milkers; (equal to Ayrshires); fawn-like head and limbs; and a well rounded form. Their flesh is of best quality.

These cattle closely resemble the renowned Devons, and if it were not for the fact that they are without horns, it would not be a hard stretch of imagination to believe them Devons, even if size and characteristics were taken into consideration. A mature steer will reach sixteen or eighteen hundred pounds gross weight and they make very profitable beef cattle.

As a dairy cow, and in this particular they are of most value, she is a fine, well-formed animal with a good development of the milk producing faculties. Her udder is broad and shapely, and the teats well spread. With good feeding and care the average "Red Polls" will yield thirty to forty pounds of rich milk per day, and of course since the milk is rich there will be a good amount of butter produced.

It is considered by many to be of great advantage to have a breed of polled cattle because they can not injure other animals by the vicious use of the horns. Those dairymen who object to cattle with horns can by procuring a pure-bred "Red Poll" effectually breed off the horns of his calves. A large percentage will be without horns owing to his strong blood.

These animals have a herd book of their own and are being imported into this country in considerable numbers. They have arrived at the point where all the large and well established cattle-shows and agricultural fairs are offering premiums for best animals of this variety, equal in amount to those paid for other breeds.



HOLSTEIN BULL, NO. 1.

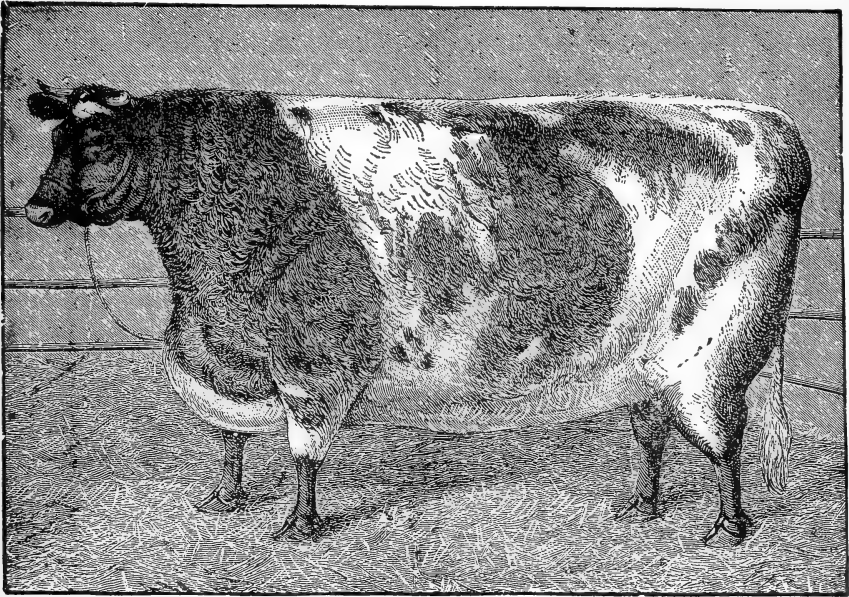
The Holsteins. The introduction and distribution of cattle was very much the same as the coming of the inhabitants. Certain portions of our land were held by the Spaniards, and to this day in the native cattle of that section will be found some of the characteristics of the Spanish herds. The English brought their short-horns and the Dutch settlers of New York brought their first cattle from Holland. These cattle for many years followed the Dutch settlers along the Hudson and

up the Mohawk, and they became the chief stock of those sections.

This breed of cattle has been greatly improved since 1800. Their native country is largely given up to the dairy interests, and it was but natural that the animals that gave the inhabitants their income should receive special care in development.

The greatest points of excellence are their milking qualities, coupled with large size, and a very compact massive frame, capable of making good beef. The oxen are very strong animals, and they can be turned into profitable beef at the end of a couple of season's labor.

They are almost invariably black and white in color, spotted, pied, or mottled in picturesque inequalities of proportion over the body, no two



HOLSTEIN BULL, NO. 2.

cattle being marked alike. The horn is short, and the hair short, fine, and silky. The lacteal formations in the cow are wonderful, thus giving them prominence in the dairy.

This breed is not well known to the cattle breeders and grazers, and as they become better known they will without doubt become important factors in the dairy interests of our country.

To give an idea of what they will produce, we append an account of a herd which was imported into this country in 1861.

"A four years old bull girls seven feet ten inches; his length is eight feet seven inches; height, four feet eleven inches; weight, twenty-four hundred sixty-five pounds.

The four imported cows, each seven years old, have an average weight of thirteen hundred twenty-five pounds. The weight of a past two years old heifer is twelve hundred forty pounds. A past yearling heifer weighed nine hundred sixty pounds; and the weight of six calves, at an average of eight months, reared in the usual way, without forcing, was an average of five hundred seventy-six pounds each.

The milking qualities of the breed may be judged by the following memoranda: one of the imported cows, when six years old, dropped a calf on the 15th of May, weighing one hundred and one pounds; and from the 26th of May to the 27th of July, by a careful and exact record, gave four thousand eighteen pounds fourteen ounces of milk. The largest yield in any one day, was seventy-six pounds five ounces, ($35\frac{1}{8}$ quarts.) In ten days she gave seven hundred forty-four pounds twelve ounces, or an average of nearly seventy-four and one-half pounds per day. She gave a good flow of milk during the season, continuing to the 24th of May following, and on the succeeding day dropped twin heifer calves, which weighed one hundred fifty-five pounds. The amount of cream produced from this cow's milk, in a vessel specially prepared for measuring it, produced twenty-two and seven-tenths of the milk, as tested by an accurate examination. The nutritive qualities of the milk were also tested by a thorough chemical analysis, and found to be excellent. It was also rich in its caseine, or cheese making properties. Six days' milk of this cow were set for cream, and the produce was seventeen pounds fourteen ounces of good butter—nearly three pounds per day; and it is claimed by her owner that she is not the very best cow of the herd.

These results show not only the remarkable productions of the cow, but the accurate and pains-taking care of the proprietor of the herd, in testing their ability at the pail. Of what the food given to the cow was composed, we are not informed. We are to presume, however, it was of the best, as every cow should have, to test to the utmost, her lacteal faculties.

Within the last twenty-five years large importations of Holstein, or, as some now term them, Friesian cattle have been made into the United

States, chiefly or altogether for milk production. Hundreds of them in herds, more or less in numbers, are kept in several of our Northern and Western States, with decided approval by their owners and propagators, as superior milk-producers. Although about equal to them in size, they lack the rotundity and fullness of the short-horn in shape, are coarser in the bone, less graceful in outline of anatomy, larger consumers of forage, yet no doubt compensating for this latter demand in the full flow of milk they yield.

As a beef-producer the Holstein steers may be said to be yet on probation. It is doubtful whether they will rival the most approved flesh-making breeds which are bred and grazed on the broad stock farms of our country, in early maturity and profit in feeding. Their entire structure and development tends solely to their lacteal products, in which they have proved a remarkable variety of their species. In this high quality they will no doubt prove a successful acquisition for the production of milk in our large city and town markets as well as to more or less extent in the dairies of our country. They have already acquired a firm position as an approved variety in our cattle culture."

HOW TO JUDGE A GOOD COW.

Among practical dairymen, there has long existed a number of rules, by which the milking properties of a milk cow are judged of; and as these rules are the results of long experience, transmitted from one generation to another, they contain, when collected together, the sum of all that information which is known by the name of practical knowledge. That this knowledge is correct, in a general way, cannot be questioned, because it is the result of actual experiments repeated and confirmed, not only for a long period of time, but in a great variety of ways, and under circumstances so different, that any errors must long ere now have been detected. Notwithstanding the existence of these established rules of judging by external signs of the qualities of an animal suitable for the dairy, there are very great differences in the modes and results of applying them practically. Some men have a natural turn, or peculiar adroitness, for minute and careful observation, which others are devoid of; and consequently the former are far more successful in rearing, selecting, or buying dairy stock, than the latter; and hence, too, we find that to these instinctive judges of stock, a glance

or a touch will reveal a greater amount of information than the closest inspection of others. While it is necessary, however, that there should be long and habitual familiarity with recognized data, in order to their being successfully applied in practice, they at the same time furnish a set of rules, a knowledge of which is of very great advantage to those who have been prevented from acquiring an experimental acquaintance with the points to which such rules refer, either by youth or want of opportunity.

“The points to be attended to, in judging of a good milk cow, are, by universal consent, considered to be shape and size of the animal, both as a whole and in detail; texture of the skin and hair, development of the lactiferous parts; temperament or habit of body and dispositions; and finally, strength and endurance of constitution. A maximum development of these points marks out a first-class cow of the breed to which she belongs; but the milking properties differ in endless variety, not merely as these points are prominent, or the reverse, but also in proportion to the circumstances of climate, soil, and treatment. The escutcheon test of M. Guenon is a new element in the question; and when fully established and better understood, will probably occupy the first rank among the external signs, which indicate the natural milking properties of cows; but as yet it is rarely recognized in Britain; and there are few farmers, even in the best dairy counties, that have ever heard of such a test.

Shape. “Whatever may be the breed to which a cow belongs, there are certain points of configuration which are considered essential, as regards her milking properties. There may be, and are frequently, great discrepancies between the one and the other; but still, generally speaking, the rule holds good that, all things being alike, the cow which approaches nearest to a certain standard, will be the best milker. The head must be rather lengthy, especially from the eye to the point of the nose; the nose and muzzle should be cleanly cut, and free from thick skin or fleshy lumps; the cheek-bones thin, and, in like manner, devoid of thick skin or flesh (not thick chapped); eye prominent, of a placid and benignant expression, with little of the white exposed to view.

If horned, the horns should taper gradually to a point, and have a clean surface, free from rugosities; the breed will determine the shape and set of the horns. The neck should be long, thin, and free from loose skin. A good milk cow may be deer or ewe-necked, but never bull-

necked. The chest and breast should be deep, rather than broad; and the brisket should project forwards and downwards; and whether large or otherwise, should be round, well-shaped, and without loose folds of skin depending from it. The girth behind the shoulders, moderate, and arising more from depth than breadth of chest; shoulders rather narrow at top; back-bone on a line with the shoulder-top; ribs arched, and well home to the haunch-bones, which should be wide apart, and form a straight line across, neither depressed in the center, at the loins, nor drooping at the extremities; hind-quarters lengthy, and the the rump, or tail-top, nearly on a line with the back-bone; thighs rather thin, but broad, well spread, and giving plenty of room for the udder; belly projecting outwards rather than downwards, with plenty of room for food; the udder should be large in a lineal direction, that is, well backward as well as upward, between the hind legs and forward on the belly; also broad in front, filling up the space between the lower flanks, but rather short vertically; a deep hanging udder, from its swinging motion, being always the cause of great fatigue to the animal when walking; the teats should be moderately long, straight, and equal in thickness from the udder to the point, and also at considerable and equal distance from each other; the two front teats, especially, should be well apart, and the direction of all four should be downward. When full of milk, the udder should be greatly enlarged in size, and, when newly emptied, shrink in a corresponding degree, and the skin gather into soft creases. The mammary glands, running on each side of the belly, large throughout their whole course, and swelling into large puffs at or near their junction with the udder; thigh veins also large and easily felt by the hand.

Of all these shapes the more important are the long, finely-formed head; long, thin neck; rump nearly on a line with the back-bone; broad quarters, long udder, from back to front, and large veins underneath the belly, and downwards, from the loins and thigh, to the udder. When seen in front, the body of a good milk cow should present the appearance of a blunted wedge, the apex of which is the breast and shoulder. Seen from behind, she should present a square, well-spread shape. Seen sideways, she should be lengthy, but not lanky."—HARTON.

The skin is considered by many a true index of the milking properties of the cow. To indicate this quality the skin should be soft and flexible on all parts of the body, especially the back ribs and on the rump bones.

DISEASES OF CATTLE AND THEIR REMEDIES.

Almost all the diseases of cattle, arise either from exposure to wet and cold weather; from their food being of a bad quality; or deficient in quantity; or from being changed too suddenly from poor, unwholesome keep, to rich pasture.

Cattle in their native state are almost free from diseases, but man, breeding with some particular object in view, has often weakened the constitutions of the breed, and that, together with their manner of feeding and care, make them liable to disease. The following general facts are appended to show the class of food and the manner of feeding that may cause disordered digestion and other diseases.

Coarse, fibrous hay overtaxes the digestive powers, irritates the mucous surface of the stomachs and bowels, and may cause an inactive condition of the stomachs, or may lead to dysentery from its effect on the bowels.

Timothy hay, while good feed for horses, when fed to cattle that do not have much exercise, will lead to constipation. Hay fed to cattle should contain clover on account of its laxative effect, because this will aid in keeping the bowels in a natural condition.

Finely ground food, such as corn-meal and middlings, should not be fed alone. They form in large balls in the stomach and resist the action of the digestive fluids, often causing very severe attacks of indigestion. Feed all finely ground grains on cut hay.

Hay badly cured or often exposed to rain while drying, is innutritious, and may produce inflammatory diseases of the stomach and bowels.

Ergot in hay, will produce gangreen of the extremities. If there is a suspicion that there is ergot in the hay, feed roots to the cattle, as they counteract in a measure the effect of the ergot.

Rusty straw and musty oats will produce disease if fed to cattle.

Smut on corn diminishes its nutritive qualities and cattle fed on it lose in weight, sometimes ending in inflammation of the fourth stomach,

Frozen turnips and potatoes produce dangerous attacks of indigestion when eaten by cattle.

Grass wet by cold dew or rain, or covered with hoar-frost, is dangerous to cattle.

Eating in excess in luxuriant pastures will produce indigestion.

Therefore when cattle are first turned into such pasture, let them remain only a short time each day, until they have become accustomed to the richer and more tempting herbage.

Too cold or too warm water may lead to weakened digestive organs. Ice water, or very cold water often produces cramps in the fourth stomach.

Mixing salt in the food is not considered expedient, as more may be given than the animal demands, thus causing undue thirst. Better have rock salt within their reach, so that they can get what nature demands.

DISEASES OF THE DIGESTIVE ORGANS.

Stomatitis. This is an inflammation of the mucous membrane of the mouth. The membrane of the mouth may become inflamed by cattle eating some irritating substance, by eating acid plants, or little vesicles may form in the mouths of calves when they are affected with indigestion, constituting what is termed aphtha.

Symptoms. The saliva dribbles from the mouth, and when it is examined the surface of the tongue and other parts of the mouth will appear red and inflamed. When young animals are affected with the form of disease termed aphtha small red elevations will be observed on the tongue and other parts of the mouth, having little white points on their centers, which consist of the epithelium of the mucous membrane raised into vesicles. These white patches are succeeded by ulcerated surfaces, which are exposed by the shedding of the white patches of epithelium.

Treatment. When there is merely a reddened and inflamed condition of the mucous membrane of the mouth, it will suffice to syringe it out several times a day with four ounces of the following solution: alum, one ounce; water, two pints. When the edges of the tongue and other parts of the mouth are studded with ulcers, these should be painted over once a day with the following solution until the affected surface is healed: iodoform, sixty grains; ether, one ounce. When indigestion is associated with an ulcerated condition of the mouth, that disorder requires separate treatment.

Sore Throat or Pharyngitis. This is an inflammation of the mucous membrane lining the pharynx. It is frequently associated with laryngitis and bronchitis, and sometimes with pleurisy.

Symptoms. The muzzle is dry, the saliva dribbles from the corner of the mouth; the animal either does not swallow, or swallows with difficulty; occasionally the liquids which it attempts to take come back in part through the nostrils, and the animal holds its neck in a stiff, straight position, moving it as little as possible. The eyelids are half closed, the white of the eye is bloodshot, and the animal occasionally grinds its teeth. When it attempts to eat hay or grass, after masticating the food the animal drops it out of its mouth, as if to avoid the pain of swallowing, and also evinces pain when pressure is applied on the pharynx externally, and tries to prevent such pressure being applied.

Causes. Pharyngitis is produced by a sudden cooling of the surface of the body, as when cattle are exposed to a cold wind or a cold rain.

Treatment, The throat should be syringed three times a day with an ounce of the following solution :

1½ drams Nitrate of Silver.
1 pint Water.

Bland and soothing drinks, such as linseed tea, oatmeal and water, should occasionally be offered. Diet should consist of soft food, such as bran mashes with a little linseed meal mixed in them. The upper part of the throat and the space between the jaws should be well rubbed once a day with the following liniment :

4 ounces Aqua Ammonia, (Stronger).
4 ounces Olive Oil.
4 ounces Oil of Turpentine.

Under the above treatment the inflammation of the throat will gradually subside and the animal will be able to swallow as usual in five or six days. During its treatment the sick animal should be kept in a comfortable stable.

Choking. This accident usually happens from attempting to swallow too large an object, such as a turnip, potato, beet, or an apple or pear, though in rare cases choking may occur from bran, chaff, or some other finely divided food lodging in and filling up a portion of the gullet. This latter form of the accident is most likely to occur in animals that are greedy feeders.

Symptoms. The symptoms will vary somewhat according to the part of the gullet or throat in which the obstruction is located. In most cases there is a discharge of saliva from the mouth; the animal coughs

frequently, and when it drinks the water is soon ejected. These symptoms, however, are not always present.

Pharyngeal Choke. It is always advisable to put a gag in the animal's mouth, and while the head is held in a horizontal direction by two assistants to pass the hand into the pharynx, and when any foreign body is found in the pharynx to withdraw it gradually and steadily. When the substance is lodged in the upper part of the gullet pressure should be made by an assistant in an upward direction while the operator passes his hand into the pharynx, and if the assistant cannot by pressure dislodge the substance from the gullet the operator may by passing his middle finger above and partly behind the substance, gradually slide the object into the pharynx and then withdraw it by the mouth.

Cervical Choke. The presence of an obstructing substance in the cervical portion of the gullet may be ascertained by passing the hand along the left side of the neck, when a hard and painless swelling will be found to indicate the presence of the foreign body. In such cases we must endeavor by gentle and persevering pressure with the thumb and two next fingers to slide the obstructing substance gradually upward to the pharynx. To facilitate this it is well to give the animal a wine-glassful of olive oil before the manipulations described are commenced. When the substance has been brought into or nearly into the pharynx, then the mouth gag should be used, the tongue drawn partially forward with the left hand, and the right should be passed forward into the pharynx so as to withdraw the obstruction. When bran or chaff causes the trouble it is best to give a small quantity of oil to lubricate the walls of the gullet and then by gentle and persevering pressure to endeavor to separate and divide the mass and then to work it downward toward the stomach. This will be assisted by pouring small quantities of oil and water down the animal's throat. It is not advisable to use the probang to push down any soft material such as oats or chaff, as this generally condenses and renders firmer the obstructing substance by pressing its particles or elements together, so that it forms a solid, resisting mass which can not be moved.

In some cases the foreign body can not be dislodged from the neck by pressing and manipulating that part externally. In such an event we must resort to the use of the probang, or if the foreign body is lodged in that part of the gullet which passes through the thorax or chest, there is no way of removing an obstruction so situated except by using

the probang. Before passing the probang a gag is introduced into the animal's mouth, and the gag should have an aperture at each end from which a strap passes and is buckled at the back of the head below the horns. The probang should then be oiled, and the head and neck being held in a straight line by two assistants, the tongue must be partly drawn out of the mouth, the probang cautiously passed along the roof of the mouth into the pharynx and then into the gullet, through which it is passed down. If resistance is met, gentle and continuous pressure must be employed, under the influence of which the agent will generally in a short time pass into the stomach. A probang is a flexible instrument, and adapts itself to the natural curvature of the gullet, so that if it is used cautiously there is not much risk of injury.

Hoven, Tympanites, or Bloating. This disease is characterized by swelling of the left flank, and is caused by the formation of gas in the rumen or paunch. (See Manikin of Cow).

Causes. Tympanites may be caused by any kind of food which produces indigestion. When cattle are first turned into young clover they eat so greedily of it that tympanites frequently results; turnips, potatoes, and cabbage may also cause it; middlings and cornmeal also frequently give rise to it. An excessive quantity of any of the before-mentioned foods may bring on this disorder; or it may not be due to excess but to eating too hastily. Sometimes the quality of the food is at fault. Grass or clover wet by dew or rain frequently disorders digestion and brings on tympanites; frozen roots or pastures covered with hoar-frost should also be regarded as dangerous. When food has been eaten too hastily, or when it is cold and wet, the digestive process is imperfectly performed and the food contained in the paunch ferments, during which process large quantities of gas are formed. The same result may follow when a cow is choked, as the obstruction in the gullet prevents the passing up of gas from the stomach, so that the gas continues to accumulate until tympanite results.

Symptoms. The swelling of the left flank is very characteristic, as in well-marked cases the flank at its upper part rises above the level of the backbone, and when struck with the tips of the fingers emits a DRUM-LIKE sound. The animal has an anxious expression, moves uneasily, and is evidently distressed. If relief is not obtained in time it breathes with difficulty, reels in walking or in standing, and in a short time falls down and dies from suffocation. The distention of the stomach may

become so great as to prevent the animal from breathing, and in some instances the case may be complicated by rupture of the stomach.

Treatment. In urgent cases the trocar should be used immediately, for when the distention of the stomach has become extreme there is no trying the remedial effect of medicine. The trocar is a sharp-pointed instrument encased in a sheath, which leaves the sharp point of the trocar freer. In selecting the point for using the trocar, a spot equally distant from the last rib, the hip bone and the transverse processes of the lumbar vertebræ must be chosen. (See Manikin of Cow). Here an incision about three-quarters of an inch long should be made through the skin, and then the sharp point of the trocar being directed downward, inward, and slightly forward, is thrust into the paunch. The sheath of the trocar should be left in the paunch as long as any gas continues to issue from it. If the canula or sheath of the trocar is removed while gas is still forming in the paunch and the left flank becomes considerably swollen it may be necessary to insert it again. Observe the canula closely, and if gas is found to be issuing from it, do not remove it. In order to be certain on this point, place the palm of the hand about two inches above the mouth of the canula, when, if the gas is issuing, the current of gas can be felt coming against the skin. It is occasionally necessary to keep the canula in the stomach for several hours. When this is necessary a piece of stout cord should be passed round the neck of the canula immediately below the projecting rim, and then be passed round the animal's body and tied in a secure knot. The rim surrounding the mouth of the canula should be in contact with the skin. When the canula is secured as described it may remain in the stomach over night. It is sometimes necessary to keep it in that position for two days. But whenever the person in charge of the cow is satisfied that gas has ceased to issue from the canula it should be removed.

The canula is only to be employed in extreme or urgent cases, though everyone who has had experience in treating indigestion in cattle will realize that he has saved the lives of many animals by its prompt application. When the tympanic animal is not distressed, and the swelling of the flank is not great, it is best to resort to the administration of internal medicine. Two ounces of aromatic spirits of ammonia should be given every half hour in a quart of cold water, or half an ounce of chloride of lime may be dissolved in a pint of tepid water, and the dose repeated every half-hour until the bloating has subsided. It is generally

necessary to give a dose of purgative medicine after bloating has subsided, as animals frequently show symptoms of constipation after attacks of indigestion. When the bloating is not too great gentle walking exercise will facilitate the removal of the gas.

Indigestion of the Third Stomach. This has been called Grass Staggers, Dry Murrain, and Wood Evil. The fact that there has been so many different names applied to this disease indicates that those who have written concerning it are by no means agreed as to its nature and cause. Among sympathetic writers, however, there seems to be a general agreement that the seat of the disease is in the third stomach, as they have followed one another faithfully in describing that part as the sole seat of trouble.

Causes. Want of exercise predisposes to this disease, or food which is coarse or indigestible may after a time produce this condition. Food which possesses astringent properties and tends to check secretion may also act as an exciting cause. Food in excessive quantity may also lead to disorder of digestion and to this disease. It is very likely to appear toward the end of protracted seasons of drought, therefore a deficiency of water must be regarded as one of the conditions which favor its development.

Symptoms. Diminished appetite, rumination irregular, tongue coated, mouth slimy, dung passed apparently not well digested and smelling badly, dullness and fullness of the flanks. It is also frequently stated that on pressing the fist below the short ribs on the right side the third stomach will be found as a hard sort of mass in that situation.

The disease may in some cases assume a chronic character in addition to the foregoing symptoms; slight bloating or tympanites of the left flank may be observed; the animal breathes with effort, and each alternately hot and cold; rumination ceases; the usual rumbling sound in the stomach is not audible; the passage of dung is almost suspended; and the animal passes only a little mucus occasionally. The patient falls away in flesh and becomes weaker, as is shown by one frequently finding it lying down. When the animal falls into this weak and exhausted condition the disease frequently terminates fatally.

Occasionally the brain becomes disordered, no doubt from the deranged condition of the stomach reaching the brain through the reflex action. There is weakness and an unsteady gait, the afflicted animal does not appear to take notice of and will consequently run against obstacles. After a time it falls down and gives up to violent and disordered

movements. This delirium is succeeded by coma or stupor, and death ensues.

Treatment. Aromatic and demulcent draughts should be given to produce a soothing effect on the mucous lining of the stomachs and to promote digestion. Two ounces of chamomile flowers should be boiled for twenty minutes in a quart of water, and the infusion on cooling should be given to the affected animal. This should be repeated about three times a day. When constipation is present the following purgative may be administered: sulphate of magnesia, one pound; Barbadoes aloes, half an ounce; powdered ginger, one pound; powdered nuxvomica, one dram; fluid extract of belladonna, half an ounce. The different powers contained in this prescription should be stirred up in two quarts of lukewarm water, then the fluid extract of belladonna and the dose administered. After this purgative has acted, if there is a lack of appetite, and the animal does not ruminate regularly, give the following tonic and antacid preparation to promote digestion, which is imperfectly performed in such cases: powdered gentian, three ounces; powdered bicarbonate of potash, three ounces; powdered ginger, three ounces; powdered capsicum, one ounce. Mix and divide into twelve powders. Give one of these powders, shaken up with half a pint of whiskey and a pint of water, three times a day before feeding. The diet must be rather laxative and of a digestible character after an attack of this form of indigestion. Food should be given in moderate quantities, as any excess by overtaking the digestive functions may bring on a relapse.

Colic, or Indigestion from Cold Water. This disorder is produced by drinking copiously of cold water, which arrests digestion and produces cramp of the fourth stomach, probably of the other stomachs, and also of the bowels. It is frequently observed in working oxen during hot weather.

Causes. It is not customary for the ox to drink much water at once. In fact he usually drinks slowly, and as if he were merely tasting the water, letting some fall out at the corners of his mouth at every mouthful. He drinks much less in proportion to his size than the horse, and when fed on green food or at pasture he may pass several days without drinking. It would, therefore, seem to be contrary to the habits of the ox to drink largely. But we find that during hot weather, when he has been working and is consequently very thirsty, if he drinks a large quantity of cold water he is immediately taken with a very severe colic.

It often affects milch cows quite severely in winter, when they are let out of a warm stable to be watered. Cows which are fed largely on dry hay drink copiously, like the working ox, and become affected in precisely the same manner. But the secretion of milk in the cow is usually much diminished after such attacks. In such cases they are seized with a chill or fit of trembling before the cramps come on.

Symptoms. There is some distension of the abdomen, but no accumulation of gas. As the distension and pain occur immediately after the animal has swallowed the water there can not be any doubt as to the exciting cause. Cruzel, in speaking of the treatment of this disease, says it is customary among French farmers to walk or even trot the ox up and down, and that as a result of this treatment the water passes from the fourth stomach into the bowel, from which it is soon passed off not much changed, except that it is slightly colored by the substances with which it has come in contact in passing through the bowel. Diarrhea then appears to be a favorable termination of this affection.

Treatment. The treatment above described should be adopted in a modified form. It is obviously dangerous to trot an animal whose stomach and bowels are largely distended with water, but it appears rational to walk the animal about for ten minutes before administering medicine, as this allows time for a portion of the contents of the stomach to pass into the bowel, and renders it safer to give medicine. In many cases the walking exercises and the diarrhea bring about a spontaneous cure of this disorder, but as in some instances the cramps and pains of the stomachs persist, give one ounce of sulphuric ether and one ounce of tincture of opium, shaken up with a pint of warm water, and to repeat the dose in half an hour if the animal is not relieved. In an emergency when medicine is not to be had, half a pint of whisky may be substituted for medicine, and should be given mixed with a pint of warm water; or a table-spoonful of powdered ginger may be administered in the same way as the remedies already mentioned.

Loss of Cud. It is very common among farmers, when a cow or ox is ailing, to say that the sick animal has lost its cud. If it is meant that the animal does not ruminate or chew the cud, and that it consequently must be sick, no fault can be found with the expression. In most cases, however, the remark is not intended to convey the idea that the animal does not ruminate, but that the loss the cud is a disease in itself. Loss of cud is a symptom of suspended rumination, and is not a disease, and shows that the animal's digestive functions are

not performed as regularly as usual. It is a symptom of a great many diseases, and when its existence is detected, it should lead the observer to try and discover other symptoms, so that on those he may base a correct opinion as to the nature of the disease from which the animal suffers.

Diarrhea. This results either from increased action of the muscular coat of the intestines, an unusually liquid state of their contents, or, generally from both of these conditions combined.

Causes. The exciting causes of diarrhea may be thus arranged: Irritation of the intestines by food taken in excess, or of improper quality, and this especially applies to soft, watery, green, food; excessive secretions, especially bile; impure water and water drunk in excess; mechanical congestion of the intestinal vessels; acute or chronic inflammation of the bowels. It may be a symptom of other diseases which depend on the presence of an animal poison in the blood, as may be observed in Texas fever and contagious pleuro-pneumonia. Causes of a more general character, viz.; exposure to changes of temperature, either excessive heat or cold may produce it.

Symptoms. The animal is dull, places its feet well under the body, arches its back, and shows thirst. Passages from the bowels are frequent, at first consisting of thin dung, but as the disease continues they become watery and offensive smelling, and may even be streaked with blood. Frequently this malady is accompanied by fever, great depression, loss of strength, rapid loss of flesh, and it may terminate in death.

Treatment. When the disease depends on irritating properties of the food which has been supplied to the animal it is advisable to give a mild purgative, such as a pint of castor or linseed oil. When the secretions of the bowels are irritating an ounce of carbonate of magnesia and half an ounce of tincture of opium should be shaken up in a quart of linseed tea and given to the animal three times a day until the passages present a natural appearance. When there is debility, want of appetite, no fever, but a continuance of the watery discharges from the bowels, then an astringent may be given. For such cases we have found the following serviceable:

6 ounces Powdered Galls,
2 ounces Powdered Gentian.

Mix and divide into twelve powders. Three times a day give one of these powder until the passages present a natural appearance. Each

powder should be mixed with a half pint of whiskey and a pint of water. When diarrhea is a symptom of a malady characterized by the presence of a blood poison, the treatment appropriate to such disease must be applied.

Dysentery. This disease begins with inflammation of the mucous membrane of the colon, though the disease may extend to the cæcum and sometimes to the rectum. It is also popularly known in this country by the names of bloody flux and red murrain.

Causes. Feeding cattle on hay which has been made during a wet season, musty oats, or any forage which is largely infested with parasitic growths. Hay or coarse grass containing a large proportion of woody fiber, pastures which have been inundated, and the vegetation growing on low, marshy, localities may set up irritation of the mucous membrane which terminates in dysentery. Water containing a large proportion of organic matter may also occasion this disease. The passages or excreta of animals suffering from the disease are to be regarded as containing an infective element, and should immediately be disinfected, burned, or buried.

Symptoms. The animal eats slowly, ruminates less frequently than when in good health, and walks slowly. Sometimes there are indications of colicky pains. As the disease advances, the animal ceases to eat and ruminate, the muzzle is dry, the eyes sunken, the cough rough, and the skin dry and adherent or hidebound. The bowels act regularly and the passages are thin, black, colored or grayish; the passages then become frequent, fetid, and are streaked with blood. This disease does not run a rapid course, and when it proves fatal the mucous membrane of the bowels will be found thickened and reddened at some parts, showing ulceration at some other points, and on some portions of its surface covered with a layer of mucus.

Treatment. When symptoms of dysentery are first observed, a pound of sulphate of magnesia should be mixed with four quarts of tepid water, and then two drams of sulphuric acid should be gradually added to this mixture. This should be given at one dose, and it is important that it should be administered at an early stage of the disease, as it not only serves to remove irritating materials from the bowels, but it has an astringent and sedative effect on the mucous surfaces and lessens the congestion. The food should be soft and easy of digestion, and may consist of grass, boiled or pulped roots, and nutritive drinks, such as linseed tea, hay tea, etc. When the purgative before mentioned has

unloaded the bowels and stomachs to some extent, the following powder should be given three times a day, mixed in a quart of linseed tea: powdered ipecacuanha, one ounce and a half; powdered opium, half an ounce; mix and divide into twelve powders. When the foregoing preparation is not found effectual, oil of turpentine may be given in half-ounce doses three times a day in a quart of new sweet milk, and among other remedies which may be employed we may mention sulphate of copper, which should be given in dram doses, combined with twenty grains of opium and mixed with at least a quart of linseed tea. Nitrate of silver may also be given in ten grain doses mixed or dissolved in a pint of distilled water. These latter remedies are especially efficacious in their effect on the ulcerations on the surface of the intestine, but it is not advisable to use them in an early stage. Whatever remedy is employed in treating dysentery, it should be given mixed in a considerable quantity of liquid, as in this way it brings the medicinal agent in contact with a large portion of the mucous surface of the diseased bowel. In addition to the treatment recommended, the diseased animal must be kept warm and comfortable, and great attention must be paid to its general comfort.

White Scour in Calves. Sucking calves are subject to a form of diarrhœa known as white scour, gastric catarrh or diarrhœa, and indigestion.

Causes. Calves which suck their dams are not frequently affected with this disease, though it may be occasioned by their sucking at long intervals and thus overloading the stomach and bringing on indigestion. Calves which are separated from their dams and which receive considerable quantities of cold milk at long intervals are liable to contract this form of indigestion. Calves fed on artificial food, which is sometimes used as a substitute for milk, also frequently contract it.

Symptoms. The milk which passes into the fourth stomach becomes curdled and acts as an irritant on the surface of the stomach and bowels, so that a catarrhal condition of their mucous surface is set up. The passages have a thin, yellowish white appearance and become very frequent. The calf becomes dull, whisks its tail as if in pain whenever there is a passage from the bowels, loses appetite, becomes weak, and unless the disease is checked, dies in a few days from exhaustion.

Treatment. The calf should have from one to two ounces of castor oil and a table-spoonful of laudanum. A mild dose of purgative medi-

cine is given to remove the curdled milk from the stomach and bowels. The object of the subsequent treatment is to allay the irritation of the stomach and bowels and to restore the digestive functions. We recommend the following to be compounded and divided into twelve powders: powdered rhubarb, one and one-half ounces; carbonate of magnesia, three ounces. One of these powders should be given four times a day; each powder to be shaken up with two wine-glassfuls of new milk, to which two tea-spoonfuls of whiskey should be added. A little fresh milk should be given five or six times a day, or the calf allowed to suck about six times a day, but the quantity should be limited. In applying treatment the mother should always be examined as to the condition of her health, diet, etc., as the disorder may sometimes be traced to some disease or mismanagement affecting the mother.

Inflammation of the Bowels, or Enteritis. Inflammation of the bowels must be held to signify in a general way inflammation of all parts of the mucous membrane of the bowels, though in some forms of what may properly be termed enteritis, we find that the mucous, muscular, and serous coats of the bowels are involved, while in other cases only a limited portion of the mucous membrane of the bowel is affected.

Causes. This disease occurs at all seasons of the year, but most frequently at times when there are great variations of temperature. Hard and long-continued work may operate as a cause in the case of oxen. Eating such food as musty hay and oats, forage containing acid plants, the leaves of trees infested with caterpillars, grass which has commenced to ferment after cutting, dusty hay, and grass covered with hoar frost may also give rise to enteritis. Drinking copiously of ice-cold water may also produce it. Exposure to a cold, damp wind or any influence which suddenly chills the surface of the body may operate as a cause.

Symptoms. Dryness of the muzzle, diminished appetite, partial or total cessation of rumination (see Loss of Cud), symptoms of colic which are indicated by restlessness. The animal lies down and gets up frequently, looks round at its flank, raises its tail, paws with its front feet, and strikes with its feet at the abdomen. After a time the symptoms of acute pain subside, and the animal lies down, but does not appear to be free from pain, turns its nose around on the flank and does not eat nor ruminate. When injections are given they are soon ejected from the the bowel, the passages are dry, glistening, and coated with mucus.

Gas is frequently passed, frequent attempts to urinate are made, but only a small quantity of urine is passed at a time. Enteritis comes on suddenly and usually runs a rapid course, death taking place in four or five hours in fatal cases. When the animal has not been long exposed to those conditions which produce the disease, recovery may take place in a comparatively short time; in exceptional cases, however, when the acute stage of the disease has subsided it may assume a chronic and lingering form.

Treatment. When the animal is seen at an early stage of the disease it should be bled to the extent of from two to four quarts. The age and condition of the animal must of course be taken into consideration in estimating the quantity of blood which should be abstracted. Half-ounce doses of laudanum should be given several times a day, mixed in a quart of linseed tea.

Constipation. Constipation is rather to be regarded as a symptom of disease than a disease in itself. We frequently observe it in a parturition fever, in that form of indigestion which is termed impaction of the third stomach, and as a result of gut-tie, invagination, twisting and knotting of the bowels. In order to remove the constipation the treatment must be applied to remove the causes which give rise to it. Calves sometimes suffer from constipation immediately after birth, and the meconium feces that accumulate in the bowels before birth is not passed, as is usually the case in calves. The cause of the disorder is supposed to be that the dams of such calves have been fed too exclusively on dry food before the calf's birth. In such cases give an ounce of castor oil shaken up with an ounce of new milk. The mother's milk is the best food to prevent a recurrence of the constipation, as it contains a large amount of fatty matter which renders it laxative in its effects.

Intestinal Worms. We may state that cattle are less infested with intestinal parasites than any other species of domestic animal, and that it is rarely necessary to apply treatment for the removal of those parasites. Two different kinds of tapeworm and four species of roundworms have, however, been found in the intestines of the bovine species. An examination of the passages is the only certain method of determining the existence of worms in the bowels.

Treatment. To remove the tapeworms give an ounce of oil of male fern three times a day in a pint of milk for three days in succession, and then on the fourth day give a pint of castor oil. For roundworms give

two drams of sulphate of iron three times a day, mixed in a little oats and middlings, and after continuing treatment for three days give a pint of castor oil as before described. Oil of turpentine may be given in doses of one ounce with milk, or santonine in dram doses in feed, to be followed by an oily purgative as described. In treating calves, which are more apt to be infested with worms than full-grown cattle, reduce the doses to one-fourth or a third.

Jaundice, the Yellows, or Congestion of the Liver. When jaundice exists there is a yellow appearance of the white of the eyes, and of the mucous membrane of the mouth. A similar aspect of the skin may also be observed in animals which are either partly or altogether covered with white hair. Jaundice is then merely a symptom of disease and ought to direct attention to ascertaining, if possible, the cause or causes which have given rise to it. A swollen condition of the mucous membrane of that part of the bowel called the duodenum may produce jaundice, as that mechanically closes the orifice of the biliary duct. In constipation there is an inactive or torpid condition of the bowel, and the bile which passes into the intestine may be absorbed and cause the yellow staining of jaundice. Jaundice is one of the symptoms of Texas fever and depends on the congested condition of the liver existing in that disease. It may also arise from the presence of parasites or gallstones in the ducts, forming a mechanical obstruction to the onward flow of bile. It may also arise from injury to the nervous system impeding the functions of the nerves supplied to the liver, and checking or diminishing the secretion of bile. This form of jaundice is, so far as we know, unknown in cattle. The conditions under which jaundice most commonly calls for treatment are when cattle have been highly fed and kept in a state of inactivity. At such a time there is an excess of nutritive elements carried into the blood, which is associated with increased fullness of the portal vein and hepatic artery. When continued high feeding has produced this congested state of the liver, the functions of that organ become disordered, so that a considerable portion of the bile, instead of being excreted and passing into the intestine is absorbed by the hepatic veins.

Symptoms. This disease occurs most frequently among stall-fed cattle. Pressure along the margin of the short ribs on the right side produces pain; the appetite is poor and the animal shows hardly any inclination to drink; the mucous membranes of the eye and mouth are yellow; the urine has a yellow or brown appearance; the animal lies

down much and moves with reluctance, moans occasionally and has a tottering gait. The ears and horns are alternately hot and cold; in cows the secretion of milk is much diminished, and that which is secreted has a bitter taste; sometimes the animal has a dry, painful cough and presents a dull, stupefied appearance.

Treatment. In such cases it is advisable to produce a free action of the bowels, so as to remove the usually congested condition of the portal vein and liver. For this purpose we recommend the administration of the following dose: sulphate of soda, sixteen ounces; fluid extract of taraxacum, half an ounce. The sulphate of soda is dissolved by stirring it up in two quarts of tepid water. The extract of taraxacum is mixed in with it, and the mixture should be administered at one dose. When a purgative effect has been produced, a dram of sulphate of cinchonidia, half an ounce of fluid extract of taraxacum and an ounce of spirits of nitrous ether may be shaken up in a pint of water, and given night and morning for several days in succession. This treatment may be assisted by giving occasional injections of warm water and soap. The diet should be laxative and moderate in quantity, and may consist of coarse bran mash, pulped roots, grass in the season and hay in moderate quantity.

Inflammation of the Liver, or Hepatitis. This is a more advanced stage of the disease already described. Hepatitis is frequently restricted to a special part of the liver, and the rest of the organ outside the area of inflammation may continue comparatively healthy.

The gland cells are the seat of inflammation, and the formation of an abscess or abscesses is a usual result.

Symptoms. The symptoms are somewhat obscure, and their real significance is frequently overlooked. This may be accounted for by the fact that only a part of the liver is affected and that by the continuance of congestion in that organ the affected parts gradually undergo those changes which are characteristic of inflammation. The most prominent symptoms are yellowness of the white of the eye and of the membrane lining the mouth; the appetite is poor; the body presents an emaciated appearance, but there is frequently fullness at the lower part of the abdomen. The gait is weak, and the animal lies down more than usual, and while doing so frequently has its head turned round resting on the side of its chest.

Treatment. Half a pound of sulphate of soda and half an ounce of fluid extract of taraxacum should be mixed with two quarts of tepid

water, and this should be given night and morning until a relaxed condition of the bowels is produced, as the object is not to cause a strong purgation, but a laxative effect which should be continued for some days. The diet should be similar to that which has been recommended in speaking of congestion of the liver. After the treatment with laxatives has been continued for several days, a dram of sulphate of cinchonidia and a dram of nitro-muriatic acid should be shaken up in a quart of cold water, and this dose should be given three times a day until the animal has regained its strength. Oil of turpentine should be rubbed in well once a day over the region of the liver. The skin on which it should be applied extends from the false ribs on the right side to six inches in front of the last one, and from the backbone to twelve inches on the right side of it. Extreme heat and pasturing animals on low lying ground are conditions favorable to the production of this disease.

Dropsy of the Abdomen or Ascites. In this disease there is a serous or watery effusion in the cavity of the abdomen.

Causes. When old animals are worked and fed on innutritious food they become what is termed anæmic; or, in other words, their blood becomes impoverished and dropsy is a common result of such treatment. An innutritious and insufficient treatment will produce the same effect in young animals. The exposure of cattle to sudden changes of temperature and the chilling effect of cold and wet acting on the skin may develop this disease. It is one of the results of peritonitis, and may also arise from acute or chronic inflammation of the liver, such as is of common occurrence when flukes are present in the liver in large numbers. When dropsy depends on disease of the liver it develops very gradually, and this may also be said in regard to it when its occurrence is associated with an insufficient amount of nutriment having been supplied to the animal.

Symptoms. A gradual increase in the size of the abdomen at its lower part, while the flanks become hollow; pallor of the mucous membrane of the mouth and eye; weak and sluggish gait; want of appetite, and irregularity in ruminating. On percussion or tapping the surface of the abdomen with the fingers a dull sound is produced. If the hand and arm are oiled and passed into the rectum as far as possible, on moving the hand from one side to the other, the fluctuation caused by the presence of fluid in the abdomen may be felt.

Treatment. The diet should be nutritious, and in those cases where we have merely to deal with anæmia (the bloodless state) arising

from insufficient diet the use of tonics and diuretics, at the same keeping the skin warm, will bring about a gradual absorption of the fluid contained in the abdomen. One of the following powders should be mixed with the animal's food three times a day; or, if there is any uncertainty as to its being taken in that way, it should be mixed with syrup, so as to form a paste, and smeared well back on the animal's tongue with a flat wooden spoon: carbonate of iron, three ounces; powdered gentian, three ounces; powdered nitrate of potash, three ounces. Mix and divide into twelve powders. The administration of purgatives which promote a watery discharge from the mucous surface of the bowels, also tends, by diminishing the serum of the blood, to bring about absorption and a gradual removal of the fluid contained in the abdomen. Large doses should not be given, but moderate doses should be administered morning and night, so as to produce a laxative effect on the bowels for some days. To attain this end the following may be used: sulphate of soda, eight ounces; powdered ginger, half an ounce; mix in two quarts of tepid water, and then give at one dose.

DISEASES OF THE PERITONEUM.

Peritonitis. Peritonitis may be divided into certain varieties, according to its mode of causation: (1) Traumatic, when the disease arises from wounds penetrating the abdomen; (2) Idiopathic, when the disease arises from exposure to cold and wet. The second variety of peritonitis occurs chiefly among working oxen, and it may here be mentioned that in those animals the membrane which lines the abdomen and covers the outer surface of the bowels is apt to become congested by sudden chilling of the skin, which empties its rich network of small blood-vessels to a large extent, so that the blood must accumulate in some part of the interior of the body.

Causes. When a working ox has been warmed up and is sweating during hard work he may have to stand some time exposed to cold wind or to a cold wind, which soon chills the surface of his body. When cattle are driven through rivers or into ponds, so that their bodies become wet, and they afterward lie on the ground when the air is cold, such exposure may produce peritonitis. Wounds penetrating the abdomen may also cause it.

Symptoms. A continuous or occasional shivering; the animal lies down, but appears uneasy; it frequently turns its head towards its belly

and lows plaintively; pressure on the flanks produces pain; has no appetite; muzzle is dry and no rumination; while standing, its legs are placed well under its body; pulse small and hard. The evacuations from the bowels are dry and hard. If this disease is complicated by the presence of inflammation of the bowels the pain is more severe and the animal is more restless. The skin is cold and dry in the early stage of this disease, but in a more advanced stage this condition may be succeeded by heat of the skin and quick breathing. The fits of trembling, uneasiness, small and hard pulse and tension of the left flank are symptoms the presence of which should enable one to reach the conclusion that peritonitis exists.

Post-mortem Appearance. The membrane lining the abdomen and covering the surface of the bowels is reddened to a greater or less extent, and there is usually considerable serous or watery fluid collected in the abdomen.

Treatment. When we have to do with the traumatic form of peritonitis, as when the horn of another animal has been thrust through the abdominal walls, this lesion must be treated in accordance with directions before given, but the general treatment must be similar to that which follows: peritonitis resulting from castration or from parturition fever must also be treated in connection with the special conditions which give rise to it, as the general treatment of this disease must be modified to some extent by the exciting cause.

The body should be warmly clothed, and it is advisable, when practicable, to have a blanket which has been wrung out of hot water placed over the abdomen, then covered by several dry blankets, which are maintained in position by straps or ropes passing round the body. The wet blanket must be changed as it cools, the object of treatment being to warm the surface of the body and to determine as much blood to the skin as possible. When the matter of clothing the body has been attended to the aim of treatment must be: (1) to obtain rest for the affected parts; (2) to subdue inflammation and fever; (3) to sustain the animal's strength. The first indication is to give a dose of laudanum or powdered opium. An ounce and a half of the first or a dram of the second may be given in a pint of tepid water, and if the pain is not perceptibly allayed the dose should be repeated in two hours. It is dangerous to give purgatives in peritonitis, as they stimulate the movements of the bowels, increase the suffering, and aggravate the disease. Tincture of aconite should be given in ten-drop doses every two hours for the pur-

pose of reducing fever and inflammation. Curzel strongly recommends bleeding for this purpose, but it should only be applied when the pulse is strong and when the animal is in good condition, and it should be borne in mind that it cannot have any beneficial effect, but the reverse, if inflammation has existed for two days. The diet should consist of laxative food and drinks, such as linseed tea. If peritonitis assumes chronic form the diet should be nutritious, such as hay, corn-stalks, linseed cake, grass, etc., and iodide of potassium should be given in dram doses dissolved in a pint of water three times a day.

DISEASES OF THE ORGANS OF RESPIRATION.

Laryngitis—Sore Throat. Laryngitis consists of an inflammation of the mucous membrane lining the larynx. It may be either a primary or a secondary disease, complicated or uncomplicated. In the majority of cases it is due to some form of exposure, a sudden change from warm to cold surroundings, or exposure to cold surroundings, or exposure to cold storms. It may also arise from inhaling irritating gases. It may be the result of external violence. In an acute attack of laryngitis there is an elevation of the temperature, pain on pressure over the region of the larynx, violent paroxysms of coughing, difficult and noisy respiration. The nostrils are dilated, the nose extended, and the animal has a frightened expression. There is marked difficulty in swallowing.

Treatment, This consists of fomentations and hot applications over the throat. Stimulating liniments, mustard, or other forms of counter irritation, may be applied in severe cases. Hot inhalations should be frequently resorted to, and often afford much relief to the suffering animal. In this disease medicines should be given as far as possible in the form of electuaries (soft solid), on account of the difficulty of deglutition. Large drafts of medicine have a tendency to produce violent spells of coughing, and in this way retard recovery. The subjoined formula for an electuary will be found to answer the purpose in ordinary cases: chlorate of potassium, pulverized, eight ounces; fluid extract of belladonna, two ounces; powdered opium, one ounce; powdered licorice root, eight ounces; syrup, sufficient quantity, and mix. At frequent intervals place a small table-spoonful of the mixture on the tongue or back teeth. Or the following may be used instead:

Aloes, powdered opium, and gum camphor in equal parts. Mix. Rub an ounce on the molar teeth every four or five hours. The bowels should be kept open and the diet should be such as the patient can easily swallow. Warm sloppy mash, boiled oatmeal gruel, linseed tea, and the like, are the most suitable substances. If suffocation is threatened during the course of the disease tracheotomy should be performed without delay.

When the disease assumes a chronic form strong counter irritation is indicated. A cantharides blister may be applied, or the following ointment may be used: biniodide of mercury, one part; lard, six parts. Mix. In some cases it will be found necessary to repeat the above application.

Pleurisy. This disease consists of an inflammation of the serous membrane lining the chest cavity and enveloping the lungs. It rarely occurs as an independent disease, but is generally complicated with pneumonia. It may be circumscribed or diffused, unilateral or double. It arises from exposure to cold and wet, as with pneumonia and bronchitis. It occasionally is caused by a penetrating wound.

Symptoms. In the first stage there is great pain, due to the dry and inflamed surfaces of the pleura rubbing together. This gives rise to the friction murmur. The temperature ranges from 104° to 105° F. The pulse is small, quick, frequent, and hard. The respirations are abdominal, the breathing being taken in short jerking inspirations and emitted in long expirations. The cough is sharp, suppressed, and painful. Pressure in the intercostal spaces gives rise to pain, the animal flinching and giving a grunt. The muzzle is dry and hot, the mouth slimy, and secretions scant. The symptoms increase in severity as the disease advances, and in the second stage effusions are poured out into the thoracic cavity. The pulse becomes soft and remains frequent and small. The elbows are turned out, and the animal has a diagnostic grunt. On percussion a dull sound as high up as the fluid has risen in the chest, and on auscultation there is absence of all respiratory murmur below this line.

Treatment. Give the same general care as recommended in bronchitis or pneumonia. In the early stages give a febrifuge to reduce the fever, as directed for pneumonia. For relief of the cough give electuary formula, which will be found in the treatment of laryngitis. The bowels must be kept relaxed and the kidneys secreting freely. In the stage of effusion give the following three times daily: tincture of digitalis, one

ounce; iodide of potassium, thirty to sixty grains; mix. Apply strong counterirritant to chest and put seton in dewlap. If collapse of the lung is threatened a surgical operation is sometimes performed, termed paracentesis thoracis, which consists in puncturing the chest cavity and drawing off a part of the fluid. The instruments used are a small trocar and canula, which are introduced between the eighth and ninth ribs. Draw the skin forward so that the external wound may not correspond with the puncture of the chest, to prevent the entrance of air. Only a portion of the fluid should be removed. The animal gets immediate relief, but it is generally only temporary, as there is a tendency for the fluid to accumulate again.

Pneumonia. This is an inflammation of the lung substance. It is divided into three different forms, viz: first, croupous; second, catarrhal; and third, intestinal pneumonia.

The causes of pneumonia in general are the same as those of the various other inflammatory diseases of the respiratory tract. It mostly follows congestion of the lungs, but may in rare cases have a parasitic origin.

Symptoms. In the first stage, that of congestion, the disease is usually ushered in by a chill, although this may not always be observed by the attendant. This is followed by an elevation of temperature, usually 105° to 106° F., or it may be even higher. The respirations are quick and shallow; the nostrils are dilated; the pulse is full and hard. Cough may or may not appear in this stage. The nose is hot and dry; the tongue sometimes protrudes and is slimy; the coat is staring, and the skin dry and harsh. The urine is usually diminished in quantity, high colored, and the bowels constipated. The animal stands with the forelegs wide apart to facilitate respiration.

In the second stage the temperature generally drops one or two degrees, and respiration is performed with much difficulty. The cough is frequent and painful. The animal still stands with the forelegs wide apart and the elbows turned outwards. If it assumes the recumbent position it rests on the sternum. All secretions are more or less suspended, particularly the milk in cows. The animal has a haggard appearance, and the pulse becomes small and wiry at this period. The extremities are hot and cold alternately: and no sound on auscultation will be heard, except it be a slight wheezing or whistling noise. On percussion dullness over the diseased lung is manifested, indicating consolidation. The lung has now assumed a liver-like appearance.

In the third stage, if the disease is going to terminate favorably, the cough becomes loose; the animal improves; the appetite returns, and the symptoms above detailed rapidly subside. But if, on the other hand, resolution is not progressing, the lung substance is broken down, is heavy, and will sink in water. In fatal cases the breath has a peculiar fetid, cadaverous odor, and is taken in short gasps; the horns, ears, and extremities become cold and clammy, and the pulse is imperceptible. On auscultation, when suppuration is taking place and the lung structure is breaking down, a bubbling or gurgling sound caused by the passage of air through pus, will be heard.

Treatment. Good hygienic surroundings and good nursing are essential in connection with the medical treatment. The probability of cure depends largely on the extent of the lung tissue involved, as well as on the intensity of the inflammatory process. In the early stage, when the fever is high, give febrifuges. If the pulse be strong and full, aconite (Fleming's tincture, two to five drops every four or five hours) may be given for a short time, but should be discontinued as soon as the fever begins to abate. Aconite is a valuable drug in the hands of the intelligent practitioner, but my experience leads me to believe that not infrequently animals are lost by its injudicious use. For in many febrile conditions it is positively contra-indicated, owing to its action upon the heart. In a plethoric animal, with a strong bounding pulse, bleeding may be resorted to instead of administering aconite. If the bowels are constipated give calomel, one to three drams, which acts as a cathartic and a febrifuge. In the second stage diffusible stimulants are required, viz: spirits of nitrous ether, two ounces; spirits aromatic ammonia, one ounce. Mix and give in gruel three times daily. If the above is not at hand, give an alcoholic stimulant. Half a pint of brandy or whisky may be given in a quart of gruel three times daily. In some cases carbonate of ammonia, two to five drams, has been found beneficial. Most practitioners apply counterirritants externally, such as mustard plasters, turpentine, and ammonia liniment, or cantharides.

Bronchitis. Bronchitis is an inflammation of the mucous membrane of the bronchial tubes. When a primary disease it is generally the result of what is commonly known as "catching cold." It may be secondary to or complicated with many of the diseases of the respiratory system. It may also be caused by breathing irritating gasses, or by the introduction of foreign bodies into the bronchial tubes, which sometimes result

from injudicious and careless drenching when the larynx is in a temporarily relaxed state. It may be acute or chronic, and is divided according to the seat of the inflammation into bronchitis proper, where the large tubes are affected, or capillary bronchitis, where the smaller tubes are affected.

Symptoms. Loss of appetite, elevation of temperature, generally 104° to 105° F. The inspiration is incomplete, short, and painful, and the expiration is prolonged. The pulse is increased in frequency, and is hard. A characteristic and painful cough is present, but it is spasmodic and incomplete.

Treatment. The animal should be placed in a light, well ventilated box, and the bowels kept in a soft condition by enemmas, etc. Avoid violent purgatives. The body should be kept warm by blanketing. In the early stages give three times daily, a draft composed as follows:

2 drams Extract Belladonna,
4 fluid ounces solution Acetate of Ammonium,
 $\frac{1}{2}$ pint Water.

In the latter stage of the disease substitute the following formula, which may be given twice daily:

3 drams Carbonate of Ammonium,
2 fluid ounces solution of Hydrochlorate of Strychnine,
1 fluid ounce Spirits of Nitrous Ether,
 $\frac{1}{2}$ pint Water.

In some cases the following is preferable to either of the above, and may be given in a pint of linseed tea every four hours:

$1\frac{1}{2}$ ounces Spirits Nitrous Ether,
2 ounces Spirits Aromatic Ammonia,
2 drams Powdered Camphor.

The food should be light and nutritious.

Bronchitis is liable to assume a chronic form if not properly treated in the earliest stage. Remedial treatment is of little value when the disease becomes chronic.

DISEASES OF THE URINARY ORGANS.

Bloody Urine. This is also called Red Water, Moor-ill, Ilæmaturia, and Ilæmaglobinuria. It is a common affection among cattle in certain localities, above all on damp, undrained lands, and under a backward agriculture. It is simply bloody urine or hæmaturia when the blood is found in clots, or when under the microscope the blood globules

can be detected as distinctly rounded, flattened discs. It is smoky urine—hæaglobinuria—when no such distinct clots nor blood discs can be found, but merely a general browning, reddening or blackening of the urine by the presence of dissolved blood-coloring matter. The bloody urine is the more direct result of structural disease of the kidneys or urinary passages (inflammation, stone, gravel, tumors, hydatids, kidney worms, sprains of the loins), while the stained urine (hæmaglobinuria) is usually the result of some general or more distant disorder in which the globules are destroyed in the circulating blood and the coloring matter dissolved in and diffused through the whole mass of the blood and of the urine secreted from it. As in the two forms, blood, and the elements of blood, escape into the urine, albumen is always present, so that there is albuminuria with blood-coloring matter superadded. If due to stone or gravel, gritty particles are usually passed, and may be detected in the bottom of a dish in which the liquid is caught. If due to fracture or severe sprain of the loins it is likely to be associated not only with some loss of control over the hind limbs, and with staggering behind, but also with a more or less perfect paralysis of the tail. The blood-stained urine without red globules results from specific diseases, Texas fever, anthrax, and from eating irritating plants (broom, savin, mercury, hellebore, ranunculus, convolvulus, colchicum, oak shoots, ash, privet, hazel, hornbeam, and other astringent, acrid, or resinous plants, etc.). The Maybug or Spanish fly taken with the food or spread over a great extent of skin as a blister has a similar action. Frosted turnips or other roots will bring on the affection in some subjects. Among conditions which act by the direct destruction of the globules in the circulating blood may be named an excess of water in that fluid; the use of water from soils rich in decomposing vegetable matter, and containing alkaline salts, especially nitrites, and the presence in the water and food of the ptomaines of bacteria growth—hence the prevalence of “red-water” in marshy districts and on clayey and other impervious soils; hence, too, the occurrence of bloody urine in the advanced stages of several contagious diseases. Some mineral poisons, such as iodine, arsenic, and phosphorous taken to excess may cause hæmaturia, and finally the symptoms may be the mere result of a constitutional predisposition of the individual or family to bleeding. Exposure of the body to cold or wet will cause the affection in some predisposed subjects.

The specific symptom of bloody or smoky water is a very patent one. It may be associated with fever or not, with the presence or absence of

abdominal tenderness on pressure, with a very frothy state of the milk or even a reddish tinge, with or without marked paleness of the mucous membranes and general weakness. When direct injury to the kidneys is the immediate cause of the disease the urine will be passed often, in small quantity at a time, and with much straining. When there is bloodlessness (a watery blood) from insufficient nourishment, fever is absent and the red water is at first the only symptom. When the active cause has been irritant plants, abdominal tenderness, colics. and other signs of bowel inflammation are marked features.

Treatment. This will vary according as the cause has been an irritant operating on a subject in vigorous health or a malarious poison acting on an animal deficient in blood and vigor. In the first form of red-water a smart purgative (one pound to one and a half pounds Glauber salts) will clear away the irritants from the bowels and allay the co-existent high fever. It will also serve to divert to the bowels much of the irritant products already absorbed into the blood, and will thus protect the kidneys. In many such cases a liberal supply of wholesome, easily digestible food will be all the additional treatment required. In this connection demulcent food (boiled flaxseed, wheat bran) is especially good. If much blood has been lost, bitters (gentian, one-half ounce) and iron (sulphate of iron, two drams) should be given for a week.

For cases in which excess of diuretic plants have been taken, it may be well to replace the salts by one to two pints olive oil, adding one ounce laudanum and two drams gum caphor. Also to apply fomentations or a fresh sheepskin over the loins. Buttermilk or vinegar, one-half pint, or sulphuric acid, sixty drops in a pint of water, may also be employed at intervals as injections. In cases due to sprained or fractured loins, to inflamed kidneys, or to stone or gravel, the treatment will be as for the particular disease in question.

In hæmaturia from anæmia (watery blood), whether from insufficient or badly-adjacent rations, or from the poisonous products of fermentation in impervious or marshy soils, the treatment must be essentially tonic and stimulating. Rich, abundant, and easily digestible food must be furnished. The different grains (oats, barley, wheat, bran, rye) and seeds (rape, linseed, cotton-seed) are especially called for, and may be given either ground or boiled. As a bitter, sulphate of quinine one-half dram, and tincture of muriate of iron two drams, may be given in a pint of water thrice a day. In some cases one or two tea-spoonfuls of oil of

turpentine twice daily in milk will act favorably, but quinine and iron are to be preferred.

But in this anæmic variety prevention is the great need. The drainage and cultivation of the dangerous soils is the main object. Until this can be accomplished young and newly-purchased cattle, not yet inured to the poisons, must be kept from the dangerous fields and turned only on those which are already drained naturally or artificially. Further, they should have an abundant ration in which the local product of grass, hay, etc., is supplemented by grain or other seeds. Another point to be guarded against is the supply of water that has drained from marshes or impervious soils, rich in organic matter, as such is charged with nitrites, ptomains; etc., which directly conduce to the disorder. Fence out from all such waters, and supply from living springs or deep wells only.

CONTAGIOUS ABORTION.

Causes of Contagious Abortion. When an aborting cow is placed in a herd that has hitherto been healthy, and shortly afterwards miscarriage becomes prevalent in that herd and continues year after year, in spite of the fact that all the other conditions of life in that herd remain the same as before, it is manifest that the result is due to contagion. When a bull, living in a healthy herd, has been allowed to serve an aborting cow, or a cow from an aborting herd, and when the members of his own herd, subsequently served by him abort in considerable numbers, contagion may be safely inferred. Mere living in the same pasture or building does not convey the infection. Cows brought into the aborting herd in advanced pregnancy carry their calves to the full time. But cows served by the infected bull, or that have had the infection conveyed by the tongue or tail of other animals, or by their own, or that have had the external genitals brought in contact with wall, fence, rubbing post, litter, or floor previously soiled by the infected animals, will be liable to suffer. The Scottish abortion committee found that when healthy, pregnant cows merely stood with or near aborting cows they escaped, but when a piece of cotton wool lodged for twenty minutes in the vagina of the aborting cow was afterwards inserted into the vagina of a healthy, pregnant cow or sheep, the latter invariably aborted within a month. So Roloff relates that in two large stables at Erfurt, without any direct intercommunication, but filled with cows fed

and managed in precisely the same way, abortion prevailed for years in the one, while not a single case occurred in the other. Galter finds that the virus from the aborting cow causes abortions in the sow, ewe, goat, rabbit, and guinea-pig; and that if it has been intensified by passing through either of the two last-named animals, it will affect also the mare, bitch and cat.

The precise germs or germ causing abortion have not yet been demonstrated beyond question. Twenty years ago Franck, of Munich, drew attention to a chain form of cells (*Leptothrix vaginalis*) as the efficient cause. The Scottish Commission have isolated in gelatin cultures five different bacteria obtained from the vaginal mucus of the aborting cow, and Nocard, of Alfort, speaks of a germ existing abundantly between the womb and fetal membranes of aborting cows which was never found in the healthy.

Symptoms of Abortion. In the first two or three months of pregnancy no symptoms may have been observed, and unless the aborted product is seen the fact of abortion may escape notice. Some soiling of the tail with mucus, blood, and the waters may be observed, or the udder may show extra firmness, and in the virgin heifer or dry cow the presence of a few drops of milk may be suggestive, or the fetus and its membranes may be found in the gutter or elsewhere as a mere clot of blood or as a membranous ball in which the forming body of the fetus is found. In water the villi of the outer membrane float out, giving it a characteristically shaggy appearance.

In advanced pregnancy abortion is largely the counterpart of parturition, so that a special description is superfluous. The important thing is to distinguish the early symptoms from those of other diseases, so that the tendency may be arrested and the animal carried to full time if possible. A cow is dull, sluggish, separate from the herd, chewing the cud languidly, or there may be frequent lying down and rising, uneasy movements of the hind feet or of the tail, and slightly accelerated pulse and breathing, and dry muzzle. The important thing is not to confound it with digestive or ordinary disorder, but in a pregnant cow to examine at once for any increase of mucus in the vagina, or for blood or liquid there or on the root of the tail; for any enlargement, firmness, or tenderness of the udder, or in dry cows milk, and above all for any slight straining suggestive of labor pains.

In many cases the membranes are discharged with the fetus; in

others, in advanced pregnancy, they fail to come away, and remain hanging from the vulva, putrefying and falling piecemeal—finally resulting in a fetid discharge from the womb. According to the size of the herd contagious abortions will follow one another at intervals of one to four or more weeks, in the order of their infection or of the recurrence of the period of activity of the womb which corresponds to the occurrence of heat.

Prevention. Weakness and bloodlessness are to be obviated by generous feeding, and especially in ailments, (wheat bran, rape cake, cotton seed, oats, barley, beans, peas, etc.), rich in earthy salts, which will also serve to correct the morbid appetite. This will also regenerate the exhausted soil if the manure is returned to it. In the same way the application of ground bones or phosphates will correct the evil, acting in this case through the soil first and raising better food for the stock. The ravages of worms are to be obviated by avoiding infested pastures, ponds, streams, shallow wells or those receiving any surface leakage from land where stock go, and by feeding salt at will, as this agent is destructive to most young worms.

The tendency to urinary calculi in winter is avoided by a succulent diet (ensilage, steamed food, roots, pumpkins, apples, potatoes, slops), and by the avoidance of the special causes named under Gravel. Furnishing water inside the barn in winter in place of driving once a day to take their fill of ice-cold liquid will obviate a common evil. Putrid and stagnant water are to be avoided. Sudden changes of food are always reprehensible, but much more so in the pregnant animal. Let the change be gradual. So with what is spoiled or unwholesome.

In case of prevalence of ergot in a pasture it should be kept eaten down, or cut down with a mower, so that no portion runs to seed. In case of a meadow the grass must be cut early before the seeds have filled. The most dangerous time appears to be between the formation of the milky seed and the full ripening. Yet the ergot is larger in proportion to the ripeness, so that the loss of potency is made up in quantity. The ripe seed and ergot may be removed by threshing and the hay safely fed. It may also be noted that both ergot and smut may be safely fed in moderate quantity, provided it is used with succulent food (ensilage, roots, etc.) or with free access to water, and salt is an excellent accessory as encouraging the animal to drink. Both ergot and smut are most injurious in winter when the water supply is frozen up or accessible only at long intervals. The ergoted seed when threshed out can

not be safely sown, but if first boiled it may be fed in small amounts or turned into manure. The growth of both ergot and smut may be to a large extent prevented by the time-honored Scotch practice of sprinkling the seed with a saturated solution of sulphate of copper before sowing.

Fields badly affected with ergot or smut may be practically renewed by plowing up and cultivating, for a series of years under crops (turnips, beets, potatoes, buckwheat, etc.), which do not harbor the fungus, and which require much cultivation and exposure of the soil. Drainage and the removal of all unnecessary barriers to the free action of sunshine and wind are important provisions.

Other precautions concerning separation from cows in heat, a proper construction of stalls, the avoidance of carrion and other offensive odors, protection from all kinds of mechanical injuries, including overdriving and carrying by rail in advanced pregnancy, the exclusion of all irritants, or strong purgatives and diuretics from food or medicine, and the guarding against all causes of indigestion and bloating have been sufficiently indicated under Causes. For protection of the womb and fetis against the various causes of disease available methods are not so evident. For cows that have aborted in the last pregnancy chlorate of potash, three drams daily before the recurrence of the expected abortion, is often useful. Prevention of contagious abortion will naturally come within this treatment.

Treatment of Contagious Abortion. So far as this differs from the treatment of sporadic abortion, it consists in the free use of germicides and disinfectants.

1. Scrape and wash the back part of the stall and gutter and water it with a solution of five ounces sulphate of copper (bluestone) in one gallon of pure water. Repeat this cleaning and watering at least once a week. This should in all cases be applied to every stall where an aborting cow has stood and to those adjacent. To treat the whole in the same way would be even better, as it is impossible to say how many of the cows harbor the germ. This is more needful that in three or four years, if the aborting cow is kept on, she becomes insusceptible and carries her calf to full time. A cow may therefore be infecting to others though she no longer aborts herself.

2. Dissolve one dram corrosive sublimate, one ounce each of alcohol and glycerine, and shake up in a gallon of water to use as an injection into the vagina and a wash for the parts about the vulva and root of

the tail. Being very poisonous, it should be kept in a wooden barrel out of the way of animals or children. Every morning the vulva, anus, the back of hips, and root of tail should be sponged with this liquid, and this is best applied to the whole herd.

3. When any case of abortion has occurred the fetal membranes must be removed by the hand without delay, and together with the fetus destroyed by burning, or buried deeply, and the stall should be cleansed and watered with the proper solution. Then the womb should be washed out with one and one-half gallons of corrosive sublimate solution injected through a rubber tube introduced to the depth of the womb and with a funnel in its outer elevated end. This should be repeated daily for a week. In the case of the other cows of the herd one injection of the same kind should be made into the vagina, after which they need only have their external parts and tail washed with the solution daily.

As a certain number of the cows will harbor the germ in the womb when treatment is started, it is not to be expected that the abortions will cease at once, but by keeping up the treatment the trouble may be gotten rid of in the following year. As an aborting cow is usually of little use for the dairy, it is best to separate and fatten her and apply treatment to remaining cows. In this as in other delicate manipulations, the stockowner will consult his own interest by employing an accomplished veterinarian, and avoiding such as have not had the privilege of a thorough professional education. In addition to the above the removal of all manure and contaminated litter and the immediate sprinkling of the surface with the sulphate of copper solution is called for. Drains should no less be thoroughly rinsed and disinfected. Milking stools and other implements may be treated in the same way, or with carbolic acid or boiling water. Great care should be taken to guard against bull or cows from an aborting herd or district; streams even may be suspected if there is an aborting herd near by and higher up on that stream. Cows sent to bull from an aborting herd are to be denied, and workmen that have attended on such a herd should be made to wash and disinfect their clothes and persons.

Duration of Pregnancy. From extended statistics it is found that the average duration of pregnancy in the cow is two hundred eighty-five days. A calf born at the two hundred fortieth day may live, and a case is reported by Deitrichs of a calf born on the three hundred thirty-fifth day, and another by the AMERICAN JOURNAL OF

MEDICAL SCIENCE as born on the three hundred thirty-sixth day. It is the general observation that in the majority of prolonged pregnancies the offspring is male. Lord Spencer found a preponderance of males between the two hundred ninetieth and the three hundredth days, but strangely enough all born after the three hundredth day under his observation were females. It might be reasonably inferred that while the prevailing tendency is to carry the males overtime, yet that the smaller and comparatively much less developed female sometimes fails to stimulate the womb to contraction until very far beyond the regular date.

DISEASES OF THE SKIN CAUSED BY PARASITES.

Mange or Itch. This is a disease of a local nature, due to a mite, which induces irritation and incrustation on the surface of the body generally. It is always contagious, requiring for its development the transplantation of the parasites or their eggs from the diseased to the healthy animal. This disease is not very common among cattle in this country, while in some countries it prevails as an epizootic. Poor hygiene seems to favor the extension of the disease, and it is claimed that weakened cattle are more predisposed to harbor the parasite than strong, healthy ones. It is also more prevalent in winter than in summer, and in the latter season sometimes entirely disappears.

Cattle are afflicted with two varieties of these parasites. They belong to the class (Arachnidæ); genera, [Psoroptes (Dermatodectes)] which simply bite and hold on to the skin; and [Chorioptes (symbiotes)] living together in large families, and not piercing further than the cuticle in search of food.

Dermatodectes communis, is the most frequent one met in cattle. It lives on the surface of the skin, and gives rise to much irritation by biting. It generally chooses the regions of the the shoulder and root of the tail for its habitation. From these localities it gradually extends by increase in numbers, causing intense itching and great distress in the affected animal. From the irritation of the skin papular nodules appear, which develop into vesicles filled with fluid and rupture. The drying of the exuding fluid forms crusts, and these are liable to be followed by ulceration. The hairs may project up through the crust or fall out. In chronic cases the skin becomes thickened and almost insensible, dry, and wrinkled. As it is easy to confound this disease with eczema, our

sole dependence for a correct diagnosis rests upon the discovery of the parasite, or, at least, upon positive evidence of contagion. The acari can be detected upon the hair and surface of the epidermis by the aid of an ordinary magnifying glass, or they may be seen with the naked eye as minute white points moving about when the infested animal stands in full glare of the sun on a warm day.

Treatment. It is of the utmost importance to cleanse the skin, removing crusts, etc., before the parasites can be effectually eradicated. For this purpose use soft soap and water, and give the animal a thorough scrubbing, especially in regions where the skin has been rubbed. If the crusts are not all removed by the first washing, apply sweet oil to soften them. They may then be washed off the following day. To kill the mites apply thoroughly with a brush the following mixture.

1 ounce Creolin,
1 ounce Oil of Tar,
 $\frac{1}{2}$ pint Soft Soap,
 $\frac{1}{2}$ pound Sulphur,
1 pint Alcohol.

Wash it off in two days with soap and water. Three or four days later a second application should be made to destroy all remaining acari. It is essential that the stable or stalls where the affected cattle have been should be cleansed and whitewashed, or saturated with sulphuric acid, one pint to three gallons of water.

Lousiness. The lice of cattle are of two kinds, the suctorial lice, which are found only upon mammals; and biting lice, which attack both mammals and fowls. Those belonging to the first variety are the short-nosed ox-louse, and the long-nosed ox-louse. The short-nosed ox-louse is larger and the harder to exterminate. It infests almost exclusively the neck and shoulders, and those parts are frequently worn bare by the animal in its efforts to rid itself of these tormentors. The full grown females of the short-horned ox-louse are from one-eighth to one-fifth of an inch long, and fully half that in width, while the males are slightly smaller. The males have a broad, black stripe running forward from the end of the body to near the middle of the abdomen; the females have no indication of this stripe. The true pumping organ, consists of a slender, piercing tube which may be greatly extended in order to reach the blood of the infested animal.

The females deposit their eggs on the hair, attaching them very near the skin by means of an adhesive substance. The long-nosed ox-louse

is the most familiar to cattlemen. The body is about an eighth of an inch long, and not more than one-third of that in width. The head is very long and slender, and no eyes are visible. In color there is little difference in the two species.

There is but one species of biting lice known to occur on cattle, the *Trichodectes scalaris*. This is very common on cattle. It is very distinct from the suctorial species in appearance, and this is readily recognized by all observers, for it is generally called "the little red louse," in contrast with the blue louse. They are also less injurious than the former.

The biting louse possesses a mouth provided with biting and cutting jaws. They attack the animal along the spine, hips, rump, and sometimes the neck and head.

Symptoms. Lousiness generally becomes manifest in winter and towards spring, when the animal is found to rub the infested portions of the body, occasionally to such an extent as to produce excoriations of the skin. It then becomes thin in flesh and debilitated. A close examination will reveal the true state, and prompt attention is advisable.

Treatment. The treatment does not vary for the three species, although the short-nosed louse is the most difficult to destroy. Take a half pound of *Cocculus Indicus* (fish berries,) for each animal, pound fine, then add two quarts of vinegar, and set it on the stove to simmer for an hour. Apply this thoroughly by rubbing it well into the hair over the infested region. This will not injure the skin or sicken the animal, and it remains effective long enough to kill all the young lice as they are hatched from the nits. Prof. Riley's kerosene emulsion is also very effective, and is made as follows: kerosene, two gallons; common or whale oil soap, one-quarter pound; water, one gallon. Heat the solution of soap and add it boiling hot to the kerosene; churn the mixture for five or ten minutes. Dilute the emulsion with eight parts of water, and apply it to the animal by a thorough rubbing. Fifty animals can be treated with ten gallons of the liquid.

Ticks or Ixodes. There are several species of ticks that attach themselves to cattle. The most common in this country is the *Boophilus bovis*. They are most numerous on uncultivated land, prairies, and woodland. They attach themselves to cattle on the thighs, flank, and neck, where they fill themselves with blood and then drop to the ground. They bore into the skin and cause considerable irritation of

the parts. They may be destroyed by the application of oil or grease which kills them by stopping up their breathing pores. When they are carelessly pulled off by hand the head sometimes breaks off and remains in the skin, causing a suppurating sore and possibly septic infection of the animal.

Fleas or Chigres. The common flea, (*pulex irritans*), penetrates the cuticle with a pair of very sharp lancets attached to its head, and draws blood from the animal. They become annoying to cattle when they are present in great numbers, and cause a diminution of milk.

The chigre, (*Sarcopsylla penetrans*), met with in some of the western States, burrows beneath or within the skin, and deposits its eggs, causing the animal to rub the parts. A small vesicle may form, succeeded occasionally by the formation of a small ulcer.

Treatment. When fleas or chigres cause much annoyance to cattle it can be prevented by moistening their skin every morning with tobacco juice or carbolic-acid water, made in the proportion of one ounce of the acid to two quarts of water.

Venomous Stings. These may be inflicted by scorpions, tarantulas, wasps, bees, hornets, etc. Occasionally an animal may be stung by a wasp or "bumble-bee" and owing to some peculiar state of the blood of the animal the injured skin will swell and form a painful enlargement. If stung by a swarm of bees the animal may become very sick and prostrated. The external application of sugar of lead water, one ounce to the pint, will usually relieve the pain and swelling. When the animal suffers constitutionally, two drams of carbonate of ammonia or four ounces of whisky should be administered every two hours until the animal rallies from the shock.

Flies and Mosquitos. These may become dangerous to cattle in sections where malignant anthrax prevails, as they may be the carriers of poison from the diseased or dead animal to the healthy one.

The tsetse fly, (*Glossina morsitans*), is very destructive to cattle, their sting causing death in many cases. Maggots hatched from the eggs deposited by flies upon wounds frequently are very annoying to the animal, and retard the healing process. The maggots from the screw-worm fly, (*Lucilia macellaria*), burrow in wounds and cause increased inflammation, and have been known to cause the death of cattle. When maggots or screw-worms appear on wounds of the skin, be they deep or superficial, no time should be lost in getting rid of them. The application of turpentine or carbolized water, (one ounce to a pint),

should be used to destroy the vermin, and the wound afterward covered with tar to keep the flies away.

Ringworm. Ringworm is an affection of the skin, due to a vegetable parasite. One of these parasites affects the hair and the outside layer of the skin, and is highly contagious, being readily transmitted from one animal to another. This fungus consists of spores and filaments. The spores being the most numerous, are round, nucleated, and seldom very much in size. They are very abundant in the hair follicle. The filaments are articulated, waving, and contain granules. The disease is productive of changes in the root and shaft of the hair, rendering them brittle and easily broken off.

The other is due to another fungus. This enters the hair follicle and involves the cuticle surrounding it, small crusts from which increase in diameter and thickness and then become elevated at their margin, forming a cup-shaped scab, the *FAVUS CUP*, which gives the disease its distinctive character. The number of these cups varies from a few to many hundreds. The hairs involved become brittle and broken, fall off with the crusts, leaving small bald patches. The crusts are of a pale or sulphur yellow color at first; as they grow older they turn darker, or to a brown color. This form of ringworm has a peculiar odor, resembling that of mice or musty straw. It is occasionally communicated to cattle by man, mice, cats, etc., all being subject to this disease.

Treatment. Remove all crusts by washing with soap and water, then apply acetic acid, sulphur ointment, or nitrate of mercury ointment, once a day. Cleanse the stable and whitewash it to destroy the spores scattered by the crusts.

PROSTRATION.

Sunstroke or Prostration from Heat. Owing to the fact that cattle are seldom put to work at which they would have to undergo severe exertion, especially in collars, they are not frequently prostrated by the extreme heat of the summer months. When at pasture they select the coolest places in the shade of trees, etc., when the heat becomes oppressive, and thereby avoid, as much as possible, the effects of it. But nevertheless cases are not uncommon when cattle suffer from the so-called sunstroke.

Cattle that have been kept up for the purpose of fattening, when driven some distance in very hot weather, are the most liable to be pros-

trated, but it must be remembered that it is not really necessary for the animal to be exposed to the rays of the sun, as those confined in hot, close places may suffer. This often happens in shipping, when they are crowded together in cars.

Symptoms. The premonitory signs are those of exhaustion—dullness, panting, frothing at the mouth, tongue hanging out, irregular gait, uneasiness, palpitation, when, if the circumstances which tend to the prostration are not mitigated, the animal staggers from side to side, falls, struggles for awhile, and then gradually becomes quiet, or the struggles may continue, with repeated but ineffectual efforts to regain a standing position. In serious cases the attack may be very sudden, unconsciousness occurring without any distressing premonitory symptoms. The less serious form is known to the colored cattle-drivers as “overhet” (overheated).

Treatment. At first, when not very serious, removal to a quiet, sheltered place, with a few days on a reduced diet, is all that need be done. When the animal has fallen, apply cold water or ice to the head; rub the body and limbs with cloths or wisps of straw, and continue the rubbing for a considerable time. If the power of swallowing is not lost (which may be ascertained by pouring a little cold water into the mouth), give three drams of liquor ammonia fort., diluted with a quart of cold water. Be very careful in drenching the animal when lying down. Repeat the drench in a half hour, and an hour after the first one has been given. Instead of the ammonia, a drench composed of three ounces of spirits of nitrous ether in a pint of water may be given, if more convenient, but in all cases the ammonia drench is preferable. If unconsciousness continues, so that a drench cannot be administered, the same quantity of ammonia and water may be injected with a syringe into the rectum. The popular aqua ammonia, commonly called “hartshorn,” will do as well as the liquor ammonia fort., but as it is weaker than the latter, the dose for a cow is about one ounce and a half, which should be diluted with a quart of water before it is given to the animal, either as a drench or an enema. When ammonia cannot be obtained quickly, two ounces of oil of turpentine (spirits of turpentine), shaken with a pint of milk, may be injected into the rectum, and will act beneficially until the ammonia is procured.

As soon as the animal is able to rise, it should be assisted and moved to the nearest shelter. All the cold water it will drink should be allowed. The ammonia or spirits of nitrous ether drench should be adminis-

tered every three hours so long as there is much failure of strength. The diet should be limited for several days; bran slops and a little grass. When signs of returning strength are presented, twelve ounces of Epsom salts dissolved in a quart of warm water may be given in those cases which have been down and unconscious, but do not give it while much weakness remains, which may be for several days after the attack. It is hardly necessary to mention that when an animal is suffering from heat prostration, bleeding should not be resorted to as a remedial measure. The writer is well aware of the fact that they are often slaughtered by butchers to save further trouble and probable loss.

DEHORNING CATTLE BY USE OF CHEMICALS.

The Farm Superintendent, L. H. Adams, of the Experimental Station of the University of Wisconsin, makes the following report:

"So far as the information of the Station goes, to Mr. John March, of Shullsburg, Wis., belongs the credit of preparing the first compound successfully used in preventing the growth of horns on calves. The preparations sold by Mr. March and also that of Lewis and Bennet, of Bloomington, Wis., have been tried at the Station with satisfactory results. They were tried on a number of calves at different ages, during the fall of 1889, with a view of obtaining definite knowledge as to the manner and proper age for application.

It was found in a majority of instances that the best results were reached when the compound was applied as soon as it was possible to locate the little horn button on the calf's head, which usually can be done when it is but three or four days old. From our experience it would seem that the dehorning compound should be fresh and the contents of the bottle well mixed before using; otherwise only partial success may be reached. The hair should be clipped from about the embryo horn with scissors, and the chemical applied with the rubber cork, wet with the fluid and rubbed hard over the button until it has penetrated the horn germ. When the germ has become soft, having an inflamed appearance, sufficient material has been applied. Care should be taken that no fluid runs down the calf's head, for the material is very caustic.

In our tests, in several instances, the fluid was applied to but one horn button, the other being left untreated. The effect usually was to stop growth of one horn, while the other grew naturally. The calves

were sold to a farmer not far distant, who agreed to keep them until grown that we might see the effect of the treatment. At two years of age, the left horn to which the compound was applied, had not developed. The right horn developed naturally, while the left side of the head to which the chemical was applied has not only failed to develop the horn, but even the heavy base which grows out from the skull to support it. This failure to develop not only the horn but its natural support, raises the query whether a hornless race of cattle could not be developed by using the dehorning compound for a number of generations.

In advertisements of chemical fluids it is often claimed that the application is painless, but our observations do not coincide with any such statement. The application of a fluid powerful enough to destroy so large a surface as the button on the calf's head, must produce a great deal of pain, and the calves show this by nervous movements of the head and attempting to rub the irritated spot. From our experience in applying the liquid, we believe it should be used on as young calves as possible, since the older the calf grows the more it seems to suffer when the horns are removed."

The question of dehorning all cattle is a question of expediency and must be justified by the expectation of benefit on the part of the owner. The practice has grown popular in many parts of the country. When the operation is performed on cattle where horns are grown, it should be done with a fine-toothed saw, and by sawing the horn off close enough to include a little of the skin and hair around its base.

Chapped Teats. These may be caused by anything which irritates them. The powerful sucking of the calf, the sudden chilling of the teat in winter after the calf has just let it go, or after the completion of milking with a wet hand; contact with cold water, or stagnant, putrid water, or with filth or irritants when lying down; slight congestions of the skin in connection with overstocking, and, indeed, any source of local irritation may cause chapping. This may be slight or extend into great gaping sores and induce retention of milk or even mammatis. Soothing applications of vaseline, or a combination of equal parts of spermaceti and oil of sweet almonds, may be applied. If healing is tardy add ten grains balsam of Peru to the ounce of ointment. If the irritation is very great, wash first with a solution one dram sugar of lead in one pint of water, and then apply benzoated oxide of zinc ointment.

MILKING.

Simply drawing the milk from the cow is not the whole process of milking. It is far too common a practice to drive cows into a filthy yard, filled for several inches with mud and drippings, and not a shed for shelter, even in bad weather.

Well regulated dairy cows should always be driven into their stables or sheds, and secured in stalls for milking. Thus the animal is under control and secure from annoyance from her neighbors. A quantity of water and a cloth should always be at hand to clean the udder and teats before milking. Allow no noise or loud talking, no scolding, nor fretting among the milkers. Teach the cows that the milkers are their friends and they will confide in their kindness.

USE OF THE SEPARATOR IN THE DAIRY.

The separator has gone through the experimental stage, and has been so thoroughly tested that the results can no longer be considered as simply experiments.

Prof. H. H. Wing, of the Agricultural Department, of Cornell University has the following to say on this important question:

"If we look at the market reports we shall see that butter is classed on the market as "creamery" and "dairy" butter. The first implying that it is butter made up in a factory built for the purpose, from the milk of a greater or less number of individual owners; and the second that is butter made up on the farm from the milk produced on the farm. If we study the reports further we shall find that in general the quotations are much higher for the creamery than for the dairy butter; this has given rise to an impression quite generally held that in some mysterious way the butter made at the factory is better than it is possible for butter to be that is made on the farm.

Now, this is entirely erroneous. Not only is it perfectly possible to make as good butter on a farm as can be made at a factory, but it is a matter of no great difficulty and does not require an expensive or elaborate equipment. The principles that govern the manufacture of good butter are the same in either case. Their observance will result in good butter on the farm just as sure as their neglect will result in bad butter in the factory. That this is so is seen in the fact that numerous private dairymen, having recognized these principles, are getting more for their

butter, made up in a small way in a private dairy, than is given for the very best grades of creamery butter. Indeed, from the fact that the private dairymen can control the cows, their feed and care and the milk from the time it leaves the cow until the finished product goes to market, he should be able to make a finer and more uniform product than the factory man, who can not control these important conditions. Notwithstanding the possibilities of the case, the facts are, that to-day the great mass of butter made on farms is sold for a less price than that made at creameries. Let us look for a moment at some of the reasons for this condition of affairs.

In the first place, there is a large amount of butter made on farms that is not good to begin with, and justly should not bring any more than it usually does. This sort of butter is made where the cows and butter-making are a sort of side issue of the farm, while the milk and butter must await the demands of all the other farm and housework before they receive attention. It is made where the maker is ignorant, careless and dirty. The cows are milked at the convenience of the hired man, and the milk is strained and put into the creamer at some indefinite time thereafter when the hired girl gets ready. Sometimes the cream is removed in twenty-four hours and sometimes not for four days. In hot weather the cream gets too sour and in cold it sometimes never gets sour at all. It is churned sometimes at a temperature too low, but often too high, and never twice alike. The buttermilk is not completely removed, salt is added by guess, and it is worked by main strength till the dairy-maid gets tired. During the whole process it associates more or less intimately with the cooked and uncooked food in the family pantry, and the wonder is not that it is bad, but that it is so good as it is.

Secondly, some farm dairy butter sells at a low price, not because it is in itself bad, but because it is made to suit the maker and not the customer. A study of the kind of butter liked best in one's market is quite as essential to high prices as a knowledge of the principles underlying good butter-making. Again a large amount of first-class farm dairy butter is spoiled on the way to market, through contact with poor butter of all degrees, and by association with "choice family groceries" in the cellar of the country store.

Another great disadvantage that farm dairy butter has on the market is that it is not made in large enough quantities at a time, so that the maker can afford to spend time and money in looking up and holding the best class of customers, but must depend upon commission men in

the general market. It is in this respect that the creamery justly enjoys a great advantage over the private dairyman, by being able to guarantee a certain amount of uniform quality regularly. And it is in this way that farmer owning, or only caring to keep a small number of cows, may secure the largest advantage through co-operation in the establishment of a creamery.

Now, let us look at some of the ways in which the quality of farm dairy butter may be easily improved. In the first place the dairy work, and particularly the butter-making, must be a distinct department of the farm work. It must be done at the proper time, regularly and systematically, and it must be done in a place devoted to it and to nothing else. This need not be a separate building, or even a very large room, but it should be carefully fitted with ventilation and drainage and should be so arranged as to be easily and completely washed out and then quickly and thoroughly dried. It should be large enough to hold the churn and butter-worker and the cream while ripening, for with the use of the separator the milk itself, as we shall see presently, need never go to the dairy room. It should not be necessary to say that scrupulous cleanliness is the all-important condition of good butter-making, and we will merely pass it over with the hint that cleanliness is a relative term and may not be nearly so clean as they think. One thing I may perhaps call attention to, and that is the use of steam, not only in removing dirt, but in killing the germs of all those fermentations and putrefactions that cause so much trouble to the butter-maker. Scalding with hot water, particularly as it is usually done, can in no sense take the place of live steam in this respect.

Attention to a few general principles in regard to the temperatures at which the various steps in the process are carried on will have a great effect on the resulting product, especially so far as the texture of the butter is concerned. These, in brief, are to effect all necessary changes gradually, to hold the temperature in the intervals as uniform as possible, and churn at as low a temperature as will bring the butter in a reasonable time.

By far the greatest factor in improving the quality of farm dairy butter and in lessening the cost of production is the introduction of the centrifugal separator, which has effected quite as great a revolution in butter-making as the introduction of improved machinery has in grain raising. It is the most efficient method known for removing cream from milk. With the greatest care in a deep-setting system at least three-

tenths of one per cent. of fat is left in the skimmed milk, and in a shallow setting system the loss is still greater. With the separator the loss is not to exceed one-tenth of one per cent. of fat, a saving of two-tenths of one per cent., or two pounds of fat in each one thousand pounds of milk. In a dairy of twenty cows giving twenty-five pounds of milk each a day, this saving would amount to a pound of fat a day, or three hundred pounds in ten months. At twenty cents per pound this would amount to \$60.00, nearly fifty per cent. of the cost of the separator.

The separator is the most cleanly method of removing the cream. The cream is removed at once from the milk, and the bulk of material that is necessary to hold and guard against destructive fermentations is reduced at least seven-eighths. The milk is thoroughly aerated during the process of separation. There is removed from the milk a certain amount of albuminous matter that would otherwise remain largely in the cream, and which easily undergoes putrefactive fermentation. While the separator may be run by hand, it is found in most cases quite as economical to use steam power, and the same boiler furnishes steam for cleaning purposes that would not otherwise be available, and the necessity for which has already been indicated.

It leaves the skim milk in by far the best condition for feeding.

It furnishes cream containing a much higher percentage of fat. This renders it possible to churn at a lower temperature, at the same time to more completely remove the fat from the buttermilk.

HOW TO TAKE CARE OF MILK.

This subject is one of the most important factors that enters into the dairy life of the average farmer. It is nearly his whole stock in trade; and his success to-day depends upon how skillfully he can manipulate his dairy to increase the flow of milk, while he curtails the cost of production. And as it is the most salable product the dairy farmer produces, it is of real interest to him that the milk be kept in proper condition until its delivery.

The care of milk should begin before it is secreted, for unless started right hidden rocks will be encountered along the dairy pathway that will make the farmer's ledger show up a trial balance on the debtor's side. First of all, he should have the environments of the stable suitable to the wants of the dear old cow, that has been the mainstay through all

the past. It should be well lighted, well ventilated and with a goodly supply of fresh air, free from stable taint, with an excess of litter for bedding, and with nutritious food, the farmer is on the road to success.

But to have all the conditions mentioned progress will be slow, unless the injunction which the Good Book records, "Man shall live by the sweat of his brow," is transformed from the common idea of physical labor to the divine creation—thought; and when we by mental exertion, succeed in starting the sweat upon our brows then it is that we progress and our minds are receptive and improvement begins along the dairy highway which leads us into the avenue of the care of milk.

The farmer should be regular about his hours of milking and feeding, be kind and gentle to his stock, and create an affection for them so that when he commences to milk, his peace of mind will not be harassed by a kick in the short ribs and the loss of a pail of milk and several cuss words. When the affection is complete all is harmony. The udder and bag should be neatly cleaned and the milking done with dry hands. As fast as milk is secured it should be carried out of the stable into the pure air or into a room set apart for milk. It should then be carefully strained through several thicknesses to remove at once all dust and filth that have accidentally reached the pail, and then should be areated either by stirring thoroughly or over any of the new styles of areators now in use, to set free from the milk the gases, foreign odors and animal heat which it contains, and to gradually lower the temperature to a point where decomposition will be arrested and where the changes will be slow; this point is usually reached when the temperature is 55° F. If the night's milk is to be held over until morning for delivery, the cans of milk should be submerged in spring or ice water to the depth of two inches above the cream line or top of the milk in the can. A very erroneous idea seems to prevail that if the can is one-half submerged in water, it will be all right; but such is false, for cream and butter fat of all the component parts of milk is the first to sour and should receive the best care. The cream that forms on the can during the night above the outside water level will be exposed to the air on top and sides and its temperature will be nearly the same as the surrounding air, and were the night warm enough the cream would be sour and the milk sweet. Therefore keep the cream or cream line below the water level on the outside of the can where the changing conditions are normal. Then, when ready for delivery, it should be placed on spring wagons and properly covered to exclude the heat and cold, and delivered in such a con-

dition that its temperature has remained the same during its transit. If these suggestions are followed out the milk shipper, factory and creamery man will have a product that will manufacture up evenly or endure a long journey.

Too much can not be said about cleanliness in the care of milk. It is the only rule that will aid in the keeping of milk, and all pails and utensils used around milk should be first rinsed in cold water, then washed and thoroughly scalded by water or steam and left in proper condition exposed to air and sunlight.

Again, too often the milking and its care is intrusted to incompetent and uninterested parties and the milk is subjected to a sink-or-swim treatment, which is equal to caring for itself under all conditions, and when it is delivered to be manufactured or shipped it is on the fast road to decomposition, which is the fruitful source of many complaints of poor milk, butter, and cheese. Yet this is the worst evil a creamery man has to contend with and his only weapons of defense are a vigilant eye and a trained nose. And yet with most careful scrutiny, milk will sometimes pass scrutiny and to all outward appearance be right, and when the crucial test is applied of holding it from forty-eight to fifty-six hours, the taints have grown until the milk is off flavor and rejected.

THE AERATION OF MILK.

The process of quickly driving out from milk the animal odors and gases, and reducing it in temperature to that point where decomposition is arrested and where the changes will be slow, is called aeration, and the apparatus used for the purpose is called an aerator. Milk thus prepared will keep from forty-eight to fifty-six hours even in the warmest weather if kept at a temperature no higher than 55° F.

The following description of an aerator and the method of use will give an idea of the general method of aerating the milk. The machines may vary but the principle is the same.

"It consists of sixteen thin copper tubes two inches in diameter, tinned on the outside, sixteen feet long, arranged one tube above the other, and the ends connected in such a manner that spring or ice water connected to the bottom tube will flow its entire length, come back through the next higher and so on until the top tube is reached, where

it is conducted to the drain or back to the ice pool to be re-chilled and sent on its circuit route by the use of a rotary pump. The milk is fed into a V shaped conductor running the entire length of the aerator, in the bottom of which are fine holes that feed the milk upon the tubes, where it spreads out into a thin layer and runs around each tube and drops to the next below until it falls over the last tube, from which it is gathered into small streams where it can be bottled readily by placing bottles in position or the milk can flow into the pan under the aerator and be drawn into cans or vats. You will note that the coldest water is in the bottom tube and the warmest at the top, so when the warm milk flows on it comes in contact with water about 60° F., and as it passes down it will leave the last tube at 40° F., if ice water is used, thus insuring you a sweet milk, free from foreign odors in the main. Fresh milk will not only contain the animal heat, but such odors as are imparted to it through injudicious feeding, unsavory foods, contamination from the stable odor and fine bulk manure that will wend its way through the finest cloth or woven wire into the cans, where it settles and when retailed in the cities the customers will remark, that the "Farmers are feeding buckwheat bran and it comes through whole." All the above mentioned odors, except the last, are in the form of gases which will readily pass off the milk if aerated while warm. If new milk is allowed to set in a can in a pool or in the atmosphere for a length of time the cream will rise and form a close seal over the milk below, and as these gases try to escape the seal they cool and liquify and immediately unite with the milk globules, and no amount of agitation or aeration will free that milk of odor after such treatment. During the hot weather as the milk of the different dairies flow over the aerator there will be a wide difference in the odors the machine gives off, and a most decidedly cheesy odor would be thrown off the night's milk that has been poorly staid with the night before and whose temperature has been allowed to remain above 60° F. all night. Such milk would sour before twenty-four hours old in ice water, and if aerated and iced would last forty-eight hours. If the farmer sells milk he should find means of aeration; whether sold to the creamery men, or shipped to market, or retailed from the farmer's wagons.

One shipper of aerated milk says that 'during the past year, with its intense heat, I did not have a can of sour milk returned from New York, and in former years my annual loss in that line would buy an aerator each year.' "

E. L. HAYNES.

SILOS AND ENSILAGE.

This subject has been much discussed of late, and the stock-raiser has come to recognize that silos have come to stay, and that if properly built and filled, they will supply a good fodder at a less cost than the plan now commonly adopted. F. A. Converse, a successful farmer of Woodville, has so ably covered the subject that we are pleased to be able to give in his own words the results of his experiments. He thus tersely covers the whole subject as to cost and advantages:

"I was an unwilling convert, because in years past I had seen silos built costing a large amount of money, and filled with a product I would not feed a decent cow. The ensilage resembled a poor quality of sauerkraut more than it did a wholesome food. Such ensilage put up from immature corn made bad results, and it was condemned, and rightly too. But conditions have changed, and men have come now to know that ensilage is not only a good food, but it is the cheapest food we can provide for our stock, and, properly cut up, no food is more wholesome, and the farmers of the future will be compelled to use the silo to meet the competition into which he will be forced in the effort to produce milk, butter, or beef at a small cost.

In going over the States, I find that the dairymen who are using the silo are able to produce more milk and do it cheaper than they could before the silo was built. This is the universal testimony. Some may ask why so many silos are abandoned. As a matter of fact there are not many silos abandoned, unless the corn crop for some cause failed; or by the whim or prejudice of certain creamery owners or condensed milk manufacturers, where poor, sour ensilage was used in the past, and as a natural consequence, to protect themselves they had to stop using the ensilage, owing to its poor quality; but where ensilage is properly put up and made from mature corn, the silos have not been abandoned.

As an evidence of the quality and flavor of milk or butter made from ensilage, it is only necessary to state that those who are getting the best for their dairy products, are feeding ensilage.

Why is ensilage better suited to cheapen milk production than any other food? Because it provides us with a succulent food in winter, without which no milch cow can do her best; it can be raised so much cheaper than any of the root crops; and the food-producing power of an acre can be doubled and thribbled over any other crop. The dairyman

pursuing the old line of feeding must have about two acres pasture, from two to three acres to raise fodder enough to put a cow through the winter, besides the grain she must have, while with corn, one-half acre will supply all she will eat during the six winter months, and then, too, there is no better way to utilize a corn crop than to put it into the silo, for there it is in its most perfect condition for food. There is not only the succulence, but the development of the woody fiber in the stalk is stopped at just the stage of growth when it is most valuable in milk production.

Another feature of this question is that the chemical action that takes place in the silo is an aid to digestion, enabling the animal to eat more than she otherwise could digest and assimilate, thus making more milk from a given amount of food than can be made from any other product fed. Ensilage is the only food that will enable a dairy to produce milk as cheap during the six winter months as during the six summer months. The dairyman in the future will be compelled to adopt ensilage, and the man who has his cows drop their calves in March and April and dries them all in November will be a back number. There is positively no excuse for such practice, allowing the cows to do business only during the summer, and then tending a lot of dirty, lazy cows all winter with no income from them. If merchants should shut up their stores and go out of business for five months in the year, and just keep the store warm and swept out, but not sell anything until spring comes, we would call them fools, but that is just what a great many dairymen are doing, and then wondering why their profits are not larger.

Look at this ensilage question in any way, one is forced to accept it as the cheapest food known for stock. The silo system has passed its experimental stage, and in these days no man needs to put up a silo excepting he is to solve the problem whether or not it is cheap food; whether or not it is a wholesome food; whether or not it will pay a farmer, whose bank account is limited, to put one up. All of these points have been decided many times over by dairymen in every dairy State in the Union. This ensilage question is not a craze or a fad. It is an accepted practice that has come to stay. The idea is not new. Silos were constructed in Egypt over twenty centuries ago, and the practice has come down to us with many improvements, until to-day we are forced to accept its utility and its advantages.

The dairy cow on the June pasture is at her best, and to keep her at her best these June conditions, both as to food and climate, must be ap-

proximated, and the only successful approximation to June food is the ensilage. Ensilage is a cheaper product than grass, and any animal that will eat grass will eat ensilage and thrive on it.

The question is often asked, what sized silo should be built for a certain number of cows? A general rule can be laid down which will answer with unerring certainty this question. Allow one cubic foot space inside the silo as a ration for one cow per day. A cubic foot will weigh about forty pounds, which will be an average ration for a one thousand pound cow. So, taking into consideration the number of cows and the time the animals are to be fed, one can readily find out the size of the silo to build, but bear in mind a silo filled full will settle from one-fifth to one-fourth, and so make calculations accordingly. So for ten cows to be fed six months it would want a silo 12x12 and 20 feet high, filled 16 feet, and for twenty cows we would need one 12x15, and 25 feet high, filled 20 feet. For thirty cows a silo 12x21, and 28 feet high, filled 22 feet is needed, and for forty cows it would be necessary to build one 12x28, and fill 22 feet. In a silo of this length it would be better to put a partition through the middle of it. These dimensions are best adapted to the construction of a silo inside the barn in the bay. The bottom of a silo should be grouted like the bottom of a cistern covered with small stones put in mortar, two parts sand and one part cement. This will make it air-tight and keep out the rats.

If the barn has an under-pinning of mason work, have the inside of the wall flush with the inside edge of the silo; furrow out with two-inch plank from the posts of the barn to within one inch of the edge of the wall; nail these planks together at the corners, and have the first one at the bottom, the next a foot higher, and the rest four to six inches apart to the top of the silo. These girders are put closer together at the bottom, on account of the strain being greater at the bottom than at the top. Nail the boards to the edges of these planks. Use rough hemlock inch boards for the siding. Put on two courses, use building paper between the courses, and pay particular attention to break joints. This will make a better and cheaper silo than matched and planed boards, because, unless Georgia pine is used, the matched lumber will pull out of the matching from the shrinking and swelling of the boards.

I have used a silo made like this for six years and it works admirably, and I can suggest only one improvement, and that is to cut the corners off, and this could be done very nicely by putting in a piece of plank, cutting off three feet of the square corner, and then boarding right

around, getting the practical benefits of a round silo. The cost of building a silo inside the barn will cost about fifty cents per ton for the amount of ensilage, or the silo for twenty cows would hold about one hundred twenty tons and cost about \$60.00, exclusive of work. Build the silo yourself at odd times, and do not expend a cent for carpenter's work. Any man who knows enough to run a saw, a hammer and a level can build a silo like these described.

If there is not room to build a silo in the barn, the cost of constructing on the same plan will be three or four times as great. Seek to have the silo inside the barn, if possible, as it is cheaper, handier, and all things considered, far the best plan. The feeding-door should be conveniently located and run to the top of the silo, so the ensilage can be fed from the top. Instead of doors use boards that can be removed as fast as the mass of ensilage settles, so that all lifting is avoided in pitching out.

Never put anything in for ensilage but corn, because you can raise three times more in food value than any other crop. Land that will produce a ton of hay per acre will raise ten tons of corn, and land that will raise one and one-half tons of hay will raise fifteen tons of corn per acre. Two and one-half tons of ensilage is worth as much as a ton of hay, so to make the producing powers of an acre equal to the corn for ensilage, we would have to raise six tons per acre. My practice of raising corn is this: I follow a three-year rotation, clover, corn, and grain, seeding with eight quarts of clover, two of timothy, mowing the clover twice, then putting it to corn the following spring. During the winter I put the manure on this clover sod as fast as it is made, about fifteen loads per acre. It is plowed in the spring about six inches deep, then rolled and fitted with a spring-tooth harrow thoroughly and marked both ways just three feet. I find it makes very little difference whether the corn is in hills or drills, if the same amount of seed is used, except in the cultivation, it often being desirable to cultivate both ways. What is wanted is the largest, earliest variety which will mature in your locality. Never, under any circumstances, put on more than ten quarts of seed to the acre, because we must remember corn is a sun plant, and to properly mature, it cannot be planted thick. Many put in a piece of fodder corn and plant it a bushel or two of seed per acre. I actually met one man this winter in southern New York who said he wanted four bushels to the acre for good, sowed corn. I would rather have a windmill than a crop like that, because I could get the wind and water into the animal

much cheaper than by feeding it such corn. It is about ninety per cent. water, and we can't afford to raise water when it is so plenty. No, never, whether for ensilage, fodder corn or field corn, put in more than ten quarts per acre. After the corn is planted, put on about three hundred pounds of commercial fertilizer made after a general formula, containing the fertilizing ingredients in the proportion needed for the corn plant, which is approximately one part of phosphoric acid, two parts nitrogen and three parts potash. Put the commercial fertilizer on broadcast rather than dropping it in the hill. I believe that the most critical time in the plant's life is just at the germination period, and when the little rootlets are sent out there is a great deal more plant-food than is needed, and as the roots grow and extend further out into the soil there is not enough to continue the rapid growth that has started at first, as the roots all feed from the ends and spread out all through the ground. Dropping fertilizer on a hill of corn and expecting the plant to be benefited is a little like a boy expecting to get his dinner while sitting on his dinner pail. As soon as the fertilizer is applied, put on a smoothing harrow and go over the piece. Do this before the corn comes up. After the corn is up, go over it again with a smoothing harrow the opposite way from the first time over. Every five or six days go over the corn until the corn is six inches high; then use a weeder, which will accomplish the same result until the corn is fifteen inches high. This method of cultivating is very important, as it kills the weeds just as they are starting and hoes the field better than it could be done by hand.

The time has gone by when you can afford to hoe any cultivated crops by hand. With horses and efficient machinery so cheap the hand-hoe must be relegated to the rear. This surface cultivation not only kills the weeds when it can be done the easiest, but no treatment of the land will conserve the moisture in the soil as will this shallow cultivation. The surface soil acts as a mulch. During a drought there are fields which have become so hard and baked that one could run a hand into the cracks on the crust that has formed, while in the garden the soil was moist and in good shape. What was the difference? One had the same amount of rain as the other. The garden was stirred frequently by repeated hoeing, while the field was not touched during the drought, so the lesson taught is to stir the soil often in all cultivated fields. An experiment conducted at the Cornell station shows that an acre of land with surface cultivation evaporates two tons less moisture every twenty-

fours hours than an acre uncultivated and unstirred. As time goes on and our forests grow less, this retention of moisture in the soil must be carefully looked after.

As soon as the weeder is stopped begin with the cultivator. Use some kind so that the depth can be governed. Never put the cultivator down over two or three inches, and two is preferable to three. If necessary to go deep, do it while the corn is very small, for deep cultivation injures the roots, and oftentimes one might better be in the house reading the paper than cultivating corn and tearing off the feeding roots, checking its growth perhaps to the extent that frost will catch it in the fall. If any of you attended the Columbian Exposition and visited the exhibit made by the department of experiment stations from Washington, you were doubtless surprised to see a corn plant with the roots washed out so that one could see the relative amount of root growth as compared with the stalk. Major Alvord, who was in charge, told me that it had been determined by careful experiment that there was more superficial area on the roots of a corn plant than there was on the stalk, and he further said in an ordinarily porous soil with the corn hills three feet and three inches apart, there was not a single cubic inch of earth to the depth of four feet that was not permeated with the fibrous roots. This will give us some idea of the harm done by putting our cultivator down six inches deep, thinking that we are doing a grand job. Cultivate as often as necessary. Using a two-horse wheel cultivator, taking two rows at a time.

Never cut the corn until it has begun to glaze. Here is where so many have made the fatal mistake of putting up the corn before it was ripe. There is a large increase in all the nutrients between the time of tasseling and the ripening of the corn. An experiment at Cornell showed that the feeding value of corn between corn in the milk and mature corn was \$14.00 for green corn, and \$48.00 for the mature corn.

In regard to cutting and filling the silo we must be governed somewhat by circumstances. Some farmers dont want a gang of men to rush it through in two or three days; others want to do this way. So far as the keeping of ensilage is concerned, it does not matter whether it is done in one day or in one month, if it is filled continuously until full. I knew of a man who filled his silo alone; going out and cutting a load, drawing it to the barn, putting the team in tread and cutting the load into the silo. He was six weeks doing it and had good ensilage.

Pack the corn into the silo, keep the surface level and thoroughly

tramp, especially around the sides and in the corners, if they are square. More loss will occur in corners and around the sides than in other portions of the silo.

When full, cover the ensilage with cut straw or chaff to the extent of two feet, cover with boards or rails, and leave until ready to feed.

Certain precautions in feeding are necessary. Everybody realizes that June conditions are best for milk production, and with the silo we approximate the June feed, green, succulent and laxative, so we must have the June climate, or in other words, don't feed your cows ensilage unless your stable is warm.

Another thing we must take into consideration, and that is, corn grown as I have indicated will have too many ears to make a good ration for a milch cow. The nutritious ratio is about one to twelve, so my practice is to go through the field and pick off about thirty or forty bushels per acre before cutting, throwing them in heaps upon the ground to feed the pigs and horses during the winter. Even then we find it necessary to feed grain with ensilage, and I use bran, malt sprouts, and cotton-seed meal. The grain is fed dry twice a day, on the ensilage. On taking the ensilage from the silo it should always be fed from the top, and not from the end. Go over the whole surface at least once in forty-eight hours, or else the mass will begin to mold.

These are essentials I have found necessary to the profitable use of ensilage as a stock food, and while we are learning something all the time about it and its use, nevertheless, any man can follow these principles, and he will make no mistake. I am often asked if I would advise a poor man, struggling with a debt, to put a silo. I want to say I most emphatically would. It will be a good investment, and as far as the rich farmer is concerned, he perhaps does not need one as much, but it will prove a blessing to any dairyman."

Sheep Husbandry.

CHARACTERISTICS OF THE VARIOUS BREEDS.

Care, Breeding, and Management.

DESCRIPTION OF THEIR VARIOUS DISEASES AND HOW TO CURE THEM.

SHEEP were raised in the earliest times simply for their pelt, and without regard to their wool. They were the earliest domesticated of any of the wild animals, and this domestication, together with the breeder, has very much changed the character of the animal. At the present time there are no wild sheep known. There are a few that are called wild sheep, but they resemble the goat more than they do the sheep.

Sacred writers considered the shepherd's occupation a favored one, and God's chosen people had all of their richest attire made of the product of the sheep. On holidays the Jewish maidens were attired in woolen garments made from the finest, softest wool. To the faithful shepherds, as they were watching their flocks, came the glad tidings of peace on earth, good will to men.

The small farmer as well as the large one, is interested in the raising of sheep. When properly understood and managed they are as great a source of profit as any of the domestic animals. While they are very tender and require special care, there is no other animal that will better repay the care and kindness in treatment.

The diseases and ailments peculiar to sheep are easily cured when understood. The measures and remedies to be adopted are within the reach of every farmer.

Sheep have attained great perfection during the last few years, and a single sheep has sold as high as \$10,000 for breeding purposes. At the present time mutton is in considerable demand as an article of food, and while neither the wool, pelt, nor flesh bring exorbitant prices, yet there is the fact that every part of the sheep is salable, and sheep raising is as profitable as any other of the various industries of the farm.

The perfection to which the sheep has grown as a wool producer, is shown by the fact that while the number of sheep in the United States has within the past quarter of a century doubled, the quantity of wool produced has quadrupled.

Wool. By consulting statistics we will readily understand why the production of wool has been the one purpose which our sheep breeders have had in view. Beginning with the year 1825 we find wool selling at seventy cents per pound, and the average price for twenty-five years from that time was over fifty-four cents per pound. Beginning again with 1850, we find wool selling at an average for the next quarter of a century of over fifty-five cents per pound, and during that time, from July, 1864, until the following spring it sold for one dollar per pound. No wonder breeders were stimulated to produce wool; no wonder they seemed to forget the carcass; and I believe that never in the history of breeding was greater advance made than was made by the breeders of this time who produced the American Merino sheep, which as a wool producer has no successful rival. Beginning again with the year 1875 we find for the next twelve years fine wool sold at an average of only forty-one cents per pound, and from that time to the present the market has drifted downward until now wool has become so low that sheep-raisers are paying more attention to the production of flesh.

Mutton. The most reliable market reports, as well as the experience of our best authorities, prove conclusively the following facts:

1. For the past few years mutton has sold at a higher average price per pound than either beef or pork.
2. A given amount or value of food will produce more pounds of mutton than of beef or pork.
3. The relative increase in the consumption of mutton is greater than in any other kind of meat.

Then in selecting sheep for the farm, remember the demand for a better class of mutton, and secure the best blood attainable for this purpose.

Selection of the Breed. "But what breed is it best to select? In order to obtain the highest degree of success in any line of business it is necessary to have a clearly-defined idea as to what is to be accomplished. One should know what kind of sheep the best markets demand and what kind is capable of producing the greatest profit. One of the greatest dangers that will attend the selection of a breed is this: it will be the desire to secure a kind of combination sheep, one at the same time that shall be a typical mutton sheep and a first-class wool-producer. No such a breed of sheep exists in the world at the present time.

The (so-called) mutton Merinos are a strong class of sheep and are good wool-producers, but when their carcass is hung up in market by the side of a Shropshire or Southdown they make a poor show. Why? because the Merino has been bred for generations with the one idea of wool-production. Better feeding will make a better fleece, but a better carcass never. The only way to make mutton sheep from a Merino flock is to cross them with rams of the pure mutton breeds and thus breed it away from its present characteristics. It will be far wiser to cross one of the mutton breeds which have been brought to their present high standing by skillful breeding, than to undertake to transform a flock of wool-producers into mutton sheep, an effort that can only result in complete failure.

Much has been said and written in regard to the merits of dark-faced breeds, and it is true that in our best markets a dark-faced lamb will readily sell for a half-dollar more than one of the same weight with a white face. Of course there is no merit in a dark face of itself, but sheep with dark faces and legs have been found to possess qualities of carcass which are superior to those found in white-faced sheep. The dark face is simply a trade-mark, which indicates the quality of the goods which accompany it. And right here is the danger. That is, that farmers will pay too great attention to the trade-mark and too little to the quality of the carcass and thus debase the trade-mark until it shall stand for naught."—F. D. WARD.

Advantages of Sheep-raising. "It is a fact, well known by every observing man, that, as a rule, dairy sections are less exhausted and the people more prosperous than grain-growing sections, and the keeping of cows, if properly done, is not only profitable, but actually makes the farm grow better. But not all parts of our State are dairy sections. Although by the extended use of the silo many sections not now keeping cows might do so to advantage, still, there are conditions

essential to dairying that do not exist in all parts, so all can not be dairymen.

To those farmers who can not be dairymen, winter sheep-feeding affords a profitable solution to the problem. It even has advantages over dairying, in that the farmer need not have the stock upon his farm more than from four to six months in a year. He may crowd his farm for all it is worth during summer in growing the needed food, and when winter sets in fill his barn with sheep and turn this food into the three "M's," mutton, money and manure, and do this with a good profit. Of course, there may be an occasional year when the feeder will but little more than "get out whole" after paying for all the food eaten, but there will be other years when he will double his money. So long as one is not a "fortune teller," who can foretell futurity, it will be dangerous bobbing in and out. One may "miss as well as hit," but he who will go into the business to "stick" will find it an average safe business and at the end of five years will find an average satisfactory profit.

In addition, the farm will rapidly grow richer. There is a further reason. One can hire men by the year for almost the same money as for eight months, so that really about all the winter labor will cost will be the board of the men, and more than this, by so hiring we can keep our best men and select the best ones that have worked during the summer for our neighbors, and any man who is kept by the year will be more efficient and valuable than would the same man only hired for the summer months. He comes to feel an interest in the farm and business, and such men are much more desirable.

Kind of Sheep to Winter. But not all sheep can be fed with equal certainty of success. If a fold of mature sheep be put in, no matter how judiciously fed, nothing can be added to them but fat. The fact is well established, that while an animal is young and growing the character of the food will determine whether the gain be lean meat or fat, but once the same animal becomes full grown and mature, feed what you may, the weight added will be fat and fat only. The size of muscle may be increased, but it will be by the crowding of particles of fat between the tissues.

Another fact must not be lost. Young animals eat, digest and assimilate more food in proportion to live weight than older ones, and our profit will depend upon the gain, and the gain comes from food eaten above what is needed to maintain the animal. The kind of sheep to be fed most profitably must be young and thrifty, and should be of some

of the mutton or meat-growing breeds, or largely tintured with that blood. For the reason that cross bred animals are, as a rule, more hardy, quick-growing and early-maturing than any pure breed, it is well to choose cross-bred lambs. Hampshire blood on the one side, preferably that of the sire, (although any of the Down breeds do well), is to be preferred. But from the fact that American Merino ewes are so much more numerous and withal so hardy, cross-bred lambs from Merino ewes and some Down sire, Hampshire, Shropshire or Southdown in the order named, are most easily obtained and as good as any.

Many feeders make the mistake of putting in lambs too old and heavy. Such lambs are so near mature that they will not make so many pounds gain. In our markets they cost more per pound, and when spring comes they will not sell for enough more per pound to make up for the larger cost when purchased in the fall. If good thrifty lambs of about fifty-five or sixty pounds can be bought about October first, they can be so fed as to get out May first at one hundred and ten to one hundred and twenty pounds without fleece, and bring top prices.

Quartering and Feeding. The old way of feeding sheep on timothy hay and corn, and letting them run all over the farm will not do in these days of close competition, and with the people asking for lean, juicy, tender meat. To get best prices, mutton must be such as is wanted by the best customers, and the day when full-grown wethers, so loaded with fat that they could hardly stand up, were paraded through the streets to attract trade to the shop of the owner has gone into oblivion, never to return. A lamb now weighing forty pounds, lean and toothsome, will sell for more money than one of those three hundred pound fat-covered wethers.

It takes food to maintain animal heat, and for all the food which goes to that use the feeders get no return. It also uses up food to enable the sheep to run all over the farm and take that great amount of "exercise," and "exercise" never makes muscle or lean meat; it only hardens it. "Exercise," while not adding to the most valuable part of the carcass, really makes that which we have less valuable.

What is wanted then is to put the lambs in a good, roomy, well-ventilated, warm and dry quarters. Keep them with just as little exercise as is consistent with health, and then feed them all the food of the right kind they can assimilate. If the sheep feeder wishes to study economy in the construction of his folds, he may build more than one story high. So long as they are sufficiently roomy and well ventilated, and the floors

are tight, the sheep fed on the upper floor will always do the best. And it is a fact that in a third-story fold the sheep on the top floor will make more gain in the same time than either of the others.

As has been hinted, it is lean meat and that which is tender and juicy, that is most desirable to have grown on our lambs. It being an admitted fact that the nitrogenous foods tend to the production of lean meat, the lambs should be largely fed on those. Among the best, in fact at the head for dry forage stands clover hay; early cut, well-cured clover hay is the best of all forage. Bean pods or pea vines are both good and much better than the best timothy hay, but timothy hay, as usually cut and cured, is among the least desirable of all foods. Early-cut, well-cured corn fodder is not bad forage, and bright, barn housed straw will be greedily eaten for one feed per day. For grain, sheep have a great hankering after variety. Constant change is very agreeable to them; in fact after they have been fed on a food for several days, however good, they will ravenously eat what would seem much less palatable. But for a stanby, wheat bran, oil meal, corn, gluten meal, oats, peas, and beans are all good, but they should be so mixed or changed from one to another as to stimulate the eating and digesting of as much as possible.

Whatever may be fed as forage or grain, no sheep must be expected to do its best or to remain healthy for more than ninety days high feeding, without plenty of succulence in their food. Nothing is better for this purpose than good corn silage, having a large amount of grain and well advanced toward ripening when put into the silo. All kinds of roots are good for sheep, and will fill the bill for succulence, but the preference would be ruta-bagas, mangels, and flat or English turnips in the order named, so far as nutrition is concerned, but counting the expense of production in connection, the list would be reversed, although it is hard to keep the flat turnips in good eating condition after February first.

But fattening sheep will certainly do better and make more gain when they can be fed both silage and roots each day. They will thrive with only one but will make more gain when having a feed in the forenoon of one and in the afternoon of the other. The succulent not only adds whatever of nutritive value it may have, but helps the sheep digest and assimilate more of the dry food. Besides the succulent food surely makes the meat of the sheep more juicy and tender.

One other thing must not be overlooked in the sheep folds. The sheep must have plenty of water and that which is fresh and clean. No

animal is more cleanly, nor is there any other that will so quickly refuse to drink water the least dirty or stale. In every pen there should be a separate trough which should always be kept so clean that the shepherd would drink from it, and at least once each day it should be emptied, so as to be sure of having fresh water.

Pens should not be crowded, but they should have at least one cubic foot of air space to each pound of live weight of animal, and it is better not to have over twenty or twenty-five in a pen, and these should be so assorted as to be nearly of the same weight and vigor.

To a man who will give them the proper care, there is no more pleasant or profitable business than winter sheep-feeding, or one that will keep his farm in such a fruitful condition.

Value of Different Kinds of Food. Experiments have been carried on at the Agricultural Experiment Station in Wisconsin, to find the results to be obtained as to cost and value of the different kinds of food. An equal number of sheep were weighed and placed in different sheds. The various flocks were fed on different kinds of food, which were carefully weighed. The results seem to prove that oat-straw is a valuable fodder, and that sheep can be maintained at four-fifths of a cent per day, when the following prices prevail: oat straw 15 cents per hundred, sugar beets 10 cents per hundred, bran at 60 cents per hundred. To find the cost of keeping sheep it is only necessary to figure the value of the produce at the place where you are located. In figuring out the result, the cost of preparing the crop for market and taking it there should be deducted from the price for which it is sold.

The amounts of food fed to four sheep for eight weeks, equalling the amount fed to thirty-two sheep for one week, or two hundred and twenty-four sheep for one day, were two hundred sixty-two pounds oat straw, seven hundred four pounds of sugar beets, fifty-six pounds of oats, and fifty-six pounds of bran.

The result of their experiments were as follows :

1. Dry fodders and cut corn fodder gave good results, as the ewes so fed were maintained cheaply, kept in the best of health, their fleeces were in the best condition, and after lambing they gave an abundant supply of milk.

2. Oat straw as a fodder for sheep was shown to have a greater feeding value than is commonly credited to it. Combined with a small quantity of grain and succulent food it offers the best return for carrying breeding ewes over the winter at the least expense. Ewes were kept in

good condition on a ration consisting largely of oat straw at less than one cent a day. The amounts of food left by the sheep were very similar to that left by the corn-fodder; as the ewes left twenty per cent. of the corn-fodder and twenty-two per cent. of the oat straw. While it is not proper to recommend an exclusive oat straw and grain ration, (because this is the result of only one experiment) upon this trial alone, yet it proves that oat straw may be used with profit, at least when fed with other fodders.

3. While timothy hay is a good dry fodder for sheep, yet, looking for the best results and closest economy, it would be best to give the preference to oat straw and corn-fodder, where these fodders are available at a comparative price not exceeding that of hay.

4. Corn silage is valuable for breeding ewes, surpassing the other succulent fodders used in this experiment in cheapness, by keeping the sheep in good thriving condition, and leading to a good flow of milk.

5. Clover silage, if properly preserved, is a good sheep food. The sheep, after getting used to it, eat it with avidity, and do well on it. Against it is the cost of making and the difficulty in preserving it.

6. Sugar beets are liked by sheep, but they cannot be said to equal either of the other succulent fodders experimented with. They are apt to induce scouring if fed in quantities of over four pounds, daily to each ewe.



A GROUP OF ALGERIANS.

DESCRIPTION AND CHARACTERISTICS OF THE VARIOUS BREEDS OF SHEEP.

Our Illustrations. We have been unusually fortunate in having the extensive collection of cuts belonging to that valuable farmers' paper, "The Country Gentleman," placed at our disposal. Through its kindness we are able to give illustrations of the various breeds that have been made from photographs of the living animals, nearly all of them prize-winners. Such illustrations are much more valuable than those drawn by the artist's fancy, making typical sheep of the various breeds according to his ideal. So many cuts of this nature have been placed before the public that the average stock-raiser is at a disadvantage when comparing his animals with those of the artist's fancy.

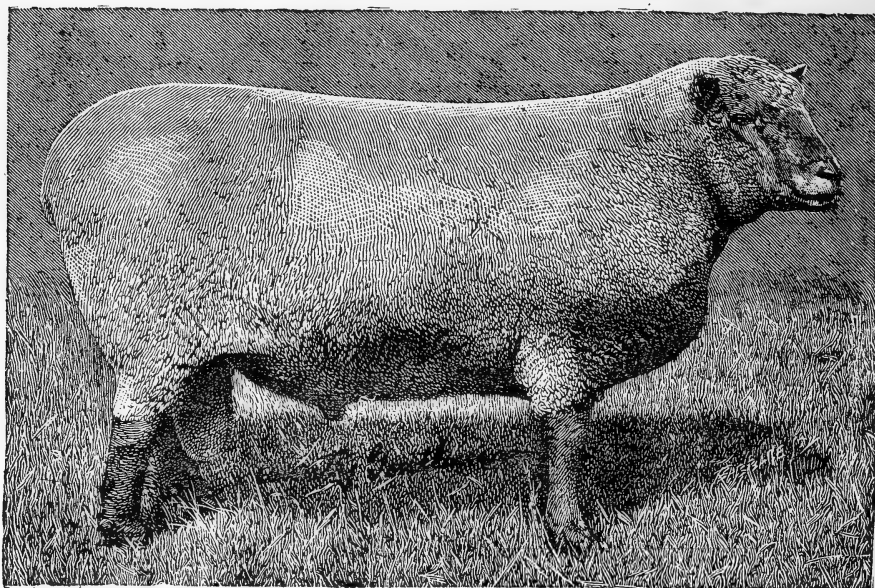
Southdown. In the south of England there is a range of low hills known as the "Downs," which have a dry soil, covered with short, sweet, rich, dense grass. These hills, or "Downs," extend from rich cultivated soil in the north, gradually descending southward to the sea. Here the Sussex, or Southdowns were bred, and at the time the breeders took them in hand were not very desirable. They were small, had thin necks, were narrow in the fore-quarters, low behind, high in front, razor-backed, and very flat ribbed. Their only point of superiority was the sweetness and excellent flavor of their flesh, which was undoubtedly the result of the excellent character of their pasture. But fifty years of weeding and constant selection of the best for breeding purposes, improved them till they became the first of the short-wool breeds.

At the present time the Southdowns hold the position of being the best mutton sheep in the world. At one year of age they dress from seventy to eighty pounds of the very choicest "lamb" in the market. Their fleece, while not heavy, will weigh five or six pounds, and it is in great demand for soft flannels.

They make excellent mothers and prolific breeders. These sheep, as now bred, are without horns, and have dark brown or black faces and legs. The body is round and deep, and of medium size, the back broad and level, the thigh full and massive, and the fore-quarters are wide and deep, with a broad breast.

It is a good feeder, and the lambs are active and hardy. The Southdowns will adapt themselves to any climate and style of farming where they can have good pasture.

The Southdown ram has no equal as a cross with Merino ewes, as the lambs are held in high esteem by the butchers because they are always plump and tender, and have that much sought-for mark, "black face."



A TYPICAL ENGLISH SOUTHDOWN.

Re-engraved from the London Live Stock Journal, this portrait of a prize-winning two-shear Southdown ram called "Son of Enterprise," bred by H. L. C. Brassey, Preston Hall, Aylesford, Kent.

"An animal of great substance, he has excellent breed character, his head, scrag, and shoulders being of the best, with loin, back, and girth all in proportion, while he has a good fleece."

French Merino. About the time of the American Revolution there were selected about a quarter of a thousand sheep from the finest flocks in Spain and these sheep were placed on a public farm near Paris in France, where the effort of improving upon the breed was undertaken. These sheep, selected from all parts of Spain, while possessing marked superiority, must have had marked differences in them. These differences, by years of very careful breeding, became merged into a breed of sheep much superior to its ancestors, and became known as

the French Merino. The improvement was so successfully carried on that this breed about 1825 became the largest pure Merinos in the world. One feature was their great folds of skin in the neck and a loose skin over the body.

The French Merino was brought to this country in the "Forties," and a single ram would produce twenty to twenty-four pounds of unwashed wool, while a single ewe would produce fifteen to eighteen pounds.

The first of this class of sheep were taken to Hartford, Connecticut, from which place they soon spread through the northern states. But they showed tenderness and fell rapidly into disfavor. They do not seem to be fitted for our severe winters and our rough farming, and require more care than most American farmers care to give a flock. The best seemed to thrive and proved profitable, but the inferior ones were good for nothing. Thus they have nearly disappeared from our continent, although since the French exposition there has again come an interest in these sheep. While not desirable as a full "bred," yet as a cross with some of our American Merinos they are of value, and even for the pure breed there is a place in our agriculture which it will hold and keep, in spite of its past adversities. It probably will not be in the north where the winters are rigid, but in the belt of our milder climate.

The Cheviot. Crossing the boundary line that separates England from Scotland are the Cheviot hills. Here has been bred for ages a variety of sheep which has received the name of its pasture land. They are a very hardy sheep, which originally were small and light-boned. It is a very useful breed, and when fed upon sweet, dry fodder, produces so choice a mutton that it is much sought after by the epicure.

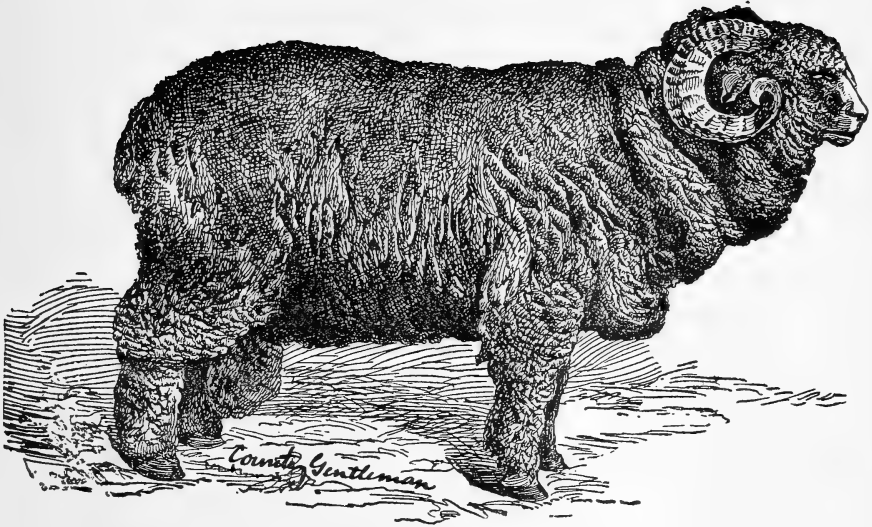
The head is without horns, and like the legs, is white. Its face is strong featured and massive, but shows gentleness, with a lively eye. The body is long, and set upon clean, trim legs. Like all breeds that have had the hills and mountains for their home, the fore-quarters are light, but they have heavy hind-quarters and a full saddle. They are a quiet and docile breed, and while as a mountain breed they stand on the top round, they are also a good lowland variety.

The Cheviots are good mothers, and the lambs are hardy, spending their whole life on their native hills without shelter, except from very severe storms. They fatten easily on turnips, without grain, and when three years old will dress eighty pounds. They shear on an average five pounds of fine wool, if fed upon a good pasture. It is their wool which has given the name to the famous Cheviot cloths.



A FINE SCOTCH CHEVIOT RAM.

In view of the recent development of the Cheviot interest in this country we give a copy of a cut taken from the Edinburgh North British Agriculturist. This portrait is considered by them "a rare good sheep of this breed," combining all the best points of "The Gentleman's Strain." His name is "The Percy" and he was bred and is owned by John Elliot, Hindhope, Jedburgh, Scotland.



A DISTINGUISHED MERINO RAM.

This ram Perfection is the property of W. B. Sanger. On August 17th, as a two-tooth he cut eighteen pounds of wool. Last year the average fleece of the flock, breeding extra, and double was fourteen pounds and one ounce.

The sire of perfection was Superb III. This noble sheep was purchased at the disposal of Hay & Markham's Vermont flock.

The great feature of Superb III is the evenness with which he is covered from nose to toes with a dense and bright fleece of good character and staple, and this is transmitted to his progeny.

The American Merino. This breed is a descendant of the Spanish Merino, and is less than a century old. It has at the present time come to be the foremost sheep of this class in the world. J. R. Graham an extensive sheep raiser on Murray River, Australia, in a report to the government, gave testimony as follows: "Of all imported sheep, those of our first cousins, the Americans are the best. The best rams imported into Melbourne of late years were Americans."

In 1809 sheep were selling for a dollar per head, but it soon became known that by importation we had gotten the very best sheep in the world. This knowledge started a fever speculation, which together with the war of 1812 caused wool to advance in price to \$2.50 per pound.

And the sheep that in 1809 sold for one dollar, in 1814 were valued at one thousand. But the war ended, the fever subsided, and the interest in breeding American merinos ceased for a time.

The American Merino is found at the present time in great perfection in numerous flocks, and possesses many distinguishing characteristics. Harry Stewart in "The Shepherd's Manual" describes them as follows:

The Carcass. "The carcass should be plump, medium sized, round, deep, not long in proportion to roundness, the head and neck short and thick; the back should be straight and broad, the breast and buttock full; the legs short, well apart, and strong, with heavy forearm and full twist. This compact figure indicates a hardy constitution, ease of keeping, and good feeding properties.

Skin. The skin should be a deep rich rose color, thin, mellow, loose, and elastic on the body. This indicates a healthy, well conditioned animal. A pale or tawny skin, indicates impurity of blood, or at least weakness of constitution, and is therefore objectionable.

Folds and Wrinkles. These are permissible to a certain extent. The fashion in this regard has doubtless passed beyond the bounds of wisdom, and excessive wrinkling or folding of the skin is unsightly and useless, if not worse. In shearing, it causes a waste of time, and gives no adequate return in wool. A deep, soft, plaited dewlap on both ewes and rams, and some slight wrinkles on the neck of the ram, satisfied the early breeders in this respect. While heavy neck-folds on the ram, and short ones back of the elbow and on the rump, are tolerated by breeders at the present time, yet it is simply fashion, and adds nothing to the value of the animal, but on the contrary is dearly paid for in the increased cost of shearing. An exception to this may be taken in respect to rams to be used in improving the poor, smooth-skinned native race common on the western plains, in which case a heavy-yolked and much wrinkled ram may be found desirable.

The Fleece. A sheep bred exclusively, or chiefly, for wool, must necessarily be valued in proportion to the value of the fleece. The wool of a pure-bred Merino of any value, should stand at right angles to the skin, presenting a dense, smooth, even surface on the exterior, opening nowhere but in those natural cracks or divisions which separate the fleece into masses. These masses should not be small in size, or they indicate excessive fineness of fleece; a quarter of an inch is the limit in this respect; nor too large, lest the wool be coarse and harsh. The length should be such as, combined with thickness of staple, will give the

greatest weight of fleece. Medium wool is generally in greater demand than fine wool, and it is more profitably produced. Two to three inches is probably the most desirable length of fleece for profit. A change, however, is taking place in this respect, since the practice of combing Merino wool has become general, and three inches and over is a frequently desired length of fiber. It is not desirable to have the face covered with wool long enough to fold up in the fleece. If the eyes are covered with such wool, the sheep is either blinded, or the wool must be kept clipped close. The ears should be small, with a coat of soft mossy hair about half way to the roots, and for the remainder, covered with wool. A naked ear is very objectionable. Evenness in quality in every part of the sheep is very desirable. Hair growing up through the wool on the thighs, the neck-folds, or scattered through the fleece here and there, is not to be allowed. The wool should be sound, that is, of even strength from end to end of the fiber. It should be highly elastic and wrinkled, curved or wavy. The number of these curls, or waves, to the inch, is not so much a test of excellence as their regularity and beauty of curvature. A folding back of the fiber upon itself is not so desirable as a gentler curve.

Pliancy and Softness. The pliancy and softness to the feeling in handling is an excellent test of quality, so much prized by manufacturers, that practiced buyers will sometimes form an accurate judgment of a fleece by handling it in the dark with gloved hands."

Shropshire Sheep. This sheep is undoubtedly the result of a cross between the Cotswold and the "Morfe" sheep. The latter were a sheep that were common in England in the latter part of the last century. The Shropshire vary somewhat, having in some sections the character of a short-wool, while in others it has the character of a medium-wool sheep.

The original sheep was horned, and had a black face, was hardy and not subject to disease, and produced about forty-five pounds of mutton to the carcass, and only about two pounds of wool.

After a century's breeding, they are now found without horns; thick necks; small, fine head, with a dark face; a good, round body; straight back; broad, deep breast; and clean, dark legs.

They are very hardy, thrive well on a moderate amount of food, are easily and quickly fattened, and at two years will produce eighty to one hundred pounds of mutton. The wool has increased, and weighs seven pounds per fleece. The ewes are good mothers and very prolific.

They are a very satisfactory farmer's sheep, especially where they have to depend upon pasturage for food. It has a close, well-set fleece, and a hardy constitution, which being combined, help to carry the animal through severe storms and exposure.



SWEEPSTAKES SHEARING SHROPSHIRE, RAM AT ROYAL SHOW, ENGLAND

Black-Faced Scotch. On the Grampian Hills where Norval's "father fed his flock," a breed now known as the Black-faced Scotch have held undisputed possession for centuries. As civilization improved the Black-faced improved with it. As indicated by the name the face is black and they have a thick muzzle. They have bright, quick eyes, square and compact bodies, broad saddles, and fair quarters. They are very hardy and able to withstand a great amount of exposure. They herd together and will in severe snow storms become completely covered with snow, in some way digging under the drifts and forming for themselves a dug-out under the snow. It is said they have been found thus buried under the drifts after twenty days of confinement and the flock all living. In Scotland after a severe storm of this kind, the shepherds start out to find their flocks which invariably bury themselves in the

snow. They dig in the snow and subsist on the herbage that is left on their heather-covered pasturage.

The ewes are excellent mothers, and the lambs are hardy. The flesh of the carcasses which average about sixty-five pounds is of a peculiarly fine flavor. This sheep would thrive and do well in our exposed mountain districts, but it is not likely they would thrive in confined situations or in a mild soft climate.

Oxford-Downs. This variety, known as one of the "long-wooled" sheep, is comparatively a new cross-breed, which has come to be favorably looked upon. It has appeared in America and is to be found on the farms of several of our most enterprising sheep-fanciers. It is a cross between a Hampshire-down ewe and a Cotswold ram. The first cross was made in 1830, but was not recognized as a separate class till 1862. The wool is finer and firmer than the Cotswold, and is from five to six inches long. On ordinary feeding, such as is usually given on a mixed farm, it will as a yearling produce a carcass from sixty to seventy-five pounds, and shear a fleece of seven pounds. By extra care and feeding it will produce much heavier carcasses. At a fat cattle show in London there were exhibited Oxford-downs under two years of age that weighed three hundred pounds each. Rams have sheared nineteen pounds for their first fleece.

They have a curly fleece, which is thickly set on a small body. The head is similar to the Cotswold, having a tuft on the forehead, but the face and legs it inherits from the Hampshire-downs, being dark in color.

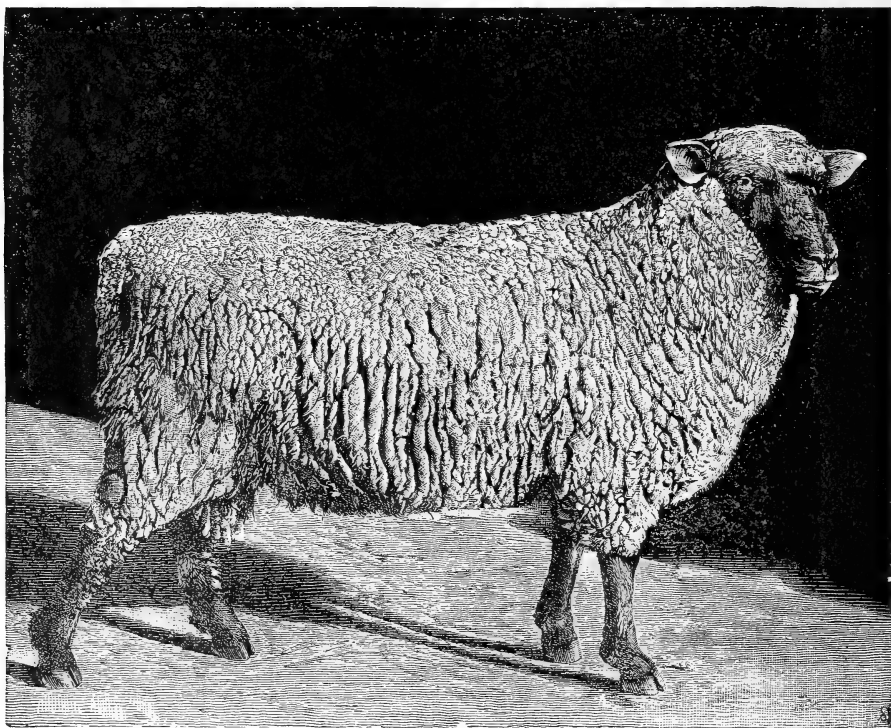
They are found very profitable feeders, and on wet soils have withstood the winters without being affected with "giddiness" or "water on the brain," that invariably attacked the Cotswolds and Southdowns.

Hampshire-Downs. This breed of sheep is rapidly rising in favor. The residents of the southern states previous to 1860 imported many of this breed of sheep, and they soon became more popular than the Southdowns. But the demands of the residents of the south for food and the raids of the northern and southern armies, caused the Hampshire-Downs to disappear from that section. It is a larger animal than the Southdown, and is valuable where a more sizable animal than the Southdown, is desired. It originated seventy-five years ago by a cross between the native sheep on Hampshire "Downs" and a pure Southdown. In this cross the horns of the native disappeared, and his

white face was supplanted by the black face of the Southdown. The legs of the native became shorter and the quality of flesh superior. But the native Roman nose, and the massiveness of head, and large size of the animal remained in the new breed of sheep.

The lambs of this breed at one year weigh from seventy-five to one hundred pounds. The fleece weighs five to seven pounds, the wool being longer and coarser than the Southdowns.

The flesh is well flavored and juicy, and the lean meat is not overburdened with fat; causing it to be much sought after by epicures.



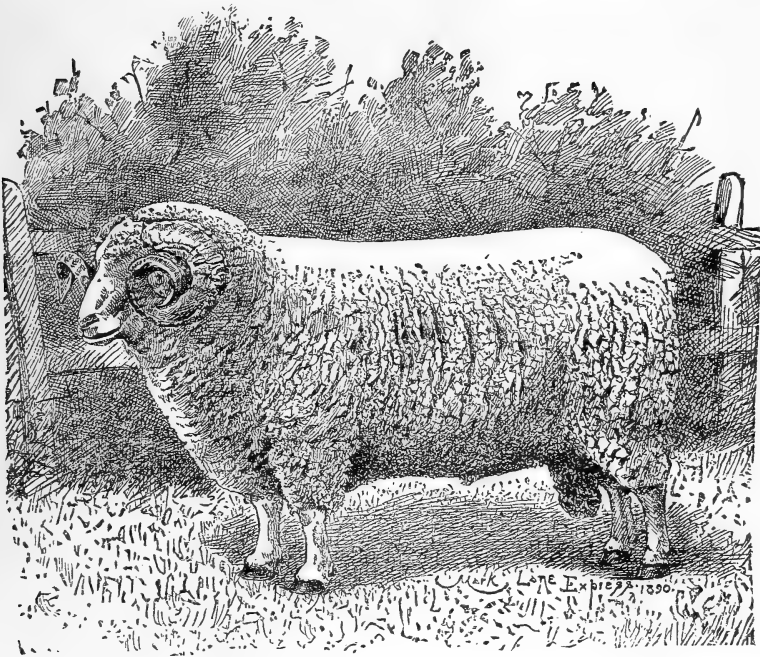
IMPORTED HAMPSHIRE-DOWN RAM, "THE BARON."

The Dorsets. This breed is sometimes called "dog-proof," because both the rams and ewes are horned and are considered able to defend themselves from an attack by these annoying animals.

It is a native of the south of England, where it has been bred for

years and remained intact. It has many characteristics that are considered valuable. It breeds at an early season and weans its lambs while they are young, and are ready to be served soon after, thus producing two crops of lambs in a year. Many of them produce twins, a Mr. Pitfield, of Bridport, Dorset, England, raised five hundred fifty-five lambs in one season from four hundred ewes.

They have long, white, broad faces, with a tuft of wool on the forehead; the nose and lips are black; the shoulders broad; the brisket straight back, and deep; and the loins are broad and deep. They have medium length legs, light in bone.

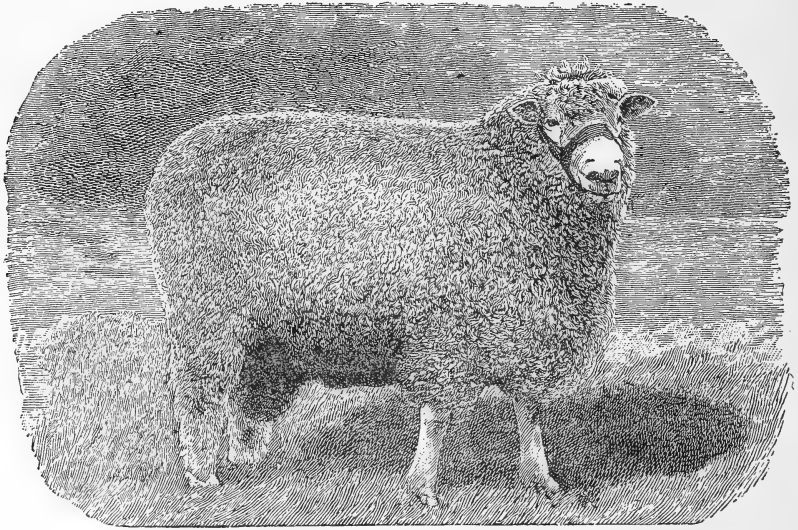


AN ENGLISH DORSET HORN YEARLING RAM.

The Dorsets are a quiet, docile, hardy breed, and will adapt themselves readily to varying conditions. They get their growth early, and when fed on turnips alone, at two years will weigh one hundred twenty-five. The fleece is not heavy, but yields about six pounds of soft, clean, white wool. The lambs produce the "lamb's wool" of which babies' underclothing is often made.

The Dorsets, when crossed with the Southdown, do not produce so many twins, but the lambs will shear about two pounds of very soft, valuable wool. These lambs, when full-grown, are larger than their Dorset mothers, and are a larger and thriftier sheep, with a heavier and finer fleece.

They have been imported into this country, and are beginning to attract attention.



A LINCOLN RAM.

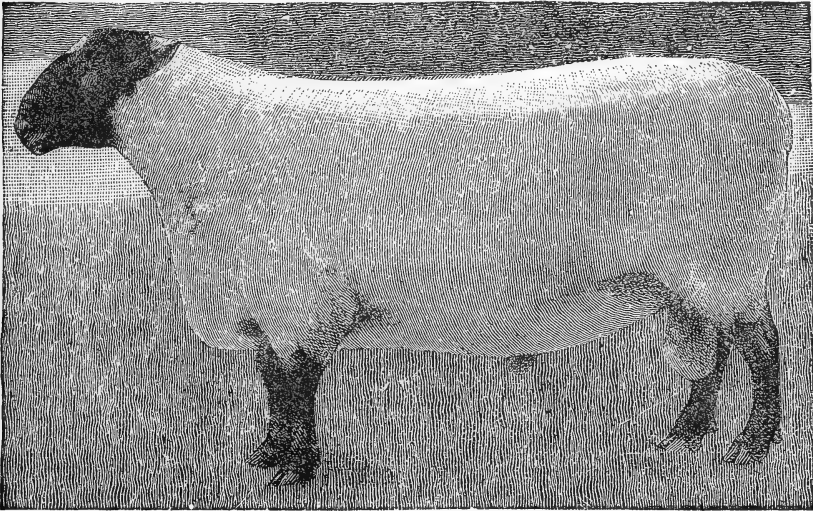
The Lincoln. This is one of the "long-wool" sheep which originated in the rich low-lands of England. These lands, however, were so productive of high-priced, marketable crops, that the sheep have been driven from their native soil to the uplands. All the other of the well-known "long-wool" varieties have been almost entirely driven out from this low, rich, alluvial soil, leaving the Lincoln almost undisputed possession.

This breed is the heaviest bodied sheep in existence. Full-grown sheep of this variety have dressed nearly one hundred pounds per quarter. It is not an unusual thing for yearlings to dress one hundred pounds and shear a dozen pounds of wool. This breed will be called a long-wooled sheep, because the wool, when full grown, often measures nine inches in length. There is a record of twenty-six pounds and six

ounces having been cut from a fourteen months old lamb of this variety.

The Lincoln requires great care and skillful management. The soil must be rich and produce sweet herbage in abundance. It is not at present the sheep for the general farmer in America, and if it has a place in this country it is apparently only in the hands of a skillful breeder.

A fine flock of these sheep has been imported into America and their adaptability to our climate is being tested.



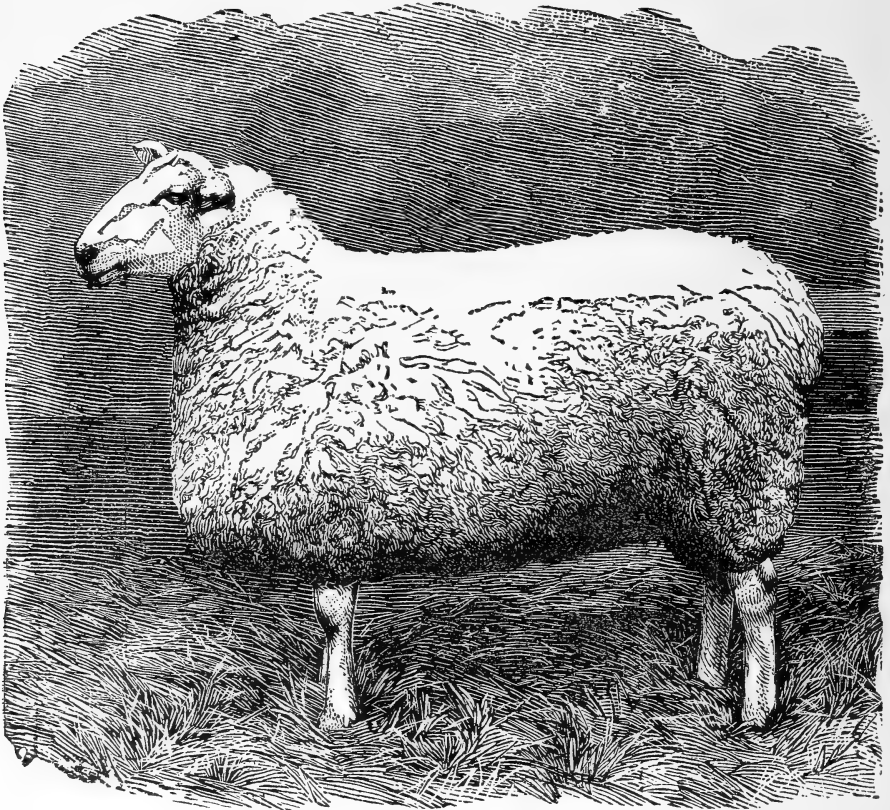
A TYPICAL SUFFOLK RAM.

The Leicester. Originally this breed was a large, heavy, coarse animal, with poorly flavored flesh. It had flat sides on a thin carcass, which was large boned. They were poor feeders, light weight, and they had long, coarse wool, of poor quality.

But by a systematic breeding the sheep has changed its character and to-day is found without horns and a white face and legs. Its head is fine and small and has no wool on the poll. It has a deep neck and broad shoulders, a broad, straight, flat back, a large, bright eye, and a deep body. Its legs are clean and the bones are small.

The flesh is sweet, but has too much outside fat to be desirable. Its fleece is fine, white, silky, and glossy, and of medium length, weighing six to eight pounds.

The Leicester as now bred is not a hardy sheep, and requires good care, extra good shelter, and special attention to keep it in a thriving condition. It can not be called a farmer's sheep, and unless improved, will not become valuable to the American farmer, only as a cross to refine the wool of the Cotswold, by a judicious cross.



PRIZE WINNING BORDER LEICESTER EWE.

The Cotswold. "This breed has become so common in America, and has been bred so extensively without fresh importations of new blood that it may well be adopted as a native sheep. Many excellent flocks are now self-sustaining, and under their American nativity lose nothing of their original excellence.

They were originally very coarse animals, with thick heavy fleece,

well adapted to their home upon the bleak exposed Cotswold hills. So valuable and staple a breed could not long remain without improvement. Naturally, the sweet nutritious herbage of the limestone covering these hills, favored this improvement, and as the pastures became enclosed, and agriculture improved in character, the flocks improved with it.

The modern Cotswold is still capable of enduring hardship and exposure, and is at home on all sorts of soils. It produces a large carcass of excellent mutton, and a heavy fleece of valuable combing wool, adapted by its peculiar character for a class of goods of wide consumption, it being in demand for various manufactures from the small matters such as worsted dress braids, up to various kinds of cloth for men's and women's garments. Moreover the breed matures at an early age. It is not unusual to find sheep of one hundred twenty pounds and over, at a year old. A full-grown sheep exhibited at a Christmas cattle market in England, dressed three hundred forty-four pounds, or eighty-six pounds per quarter. The weight of the fleece should average eight pounds for a flock of all kinds, and some of our naturalized flocks surpass this weight of fleece. The description of a well-bred Cotswold is as follows: the face and legs are white, but sometimes dashes of gray or brown derived from the original stock, may be found on both face and forelegs. The head is strong and massive with sometimes a Roman nose, without horns, and having a thick forelock of wool upon the forehead. The neck and forequarters are not so square and heavy, nor the brisket so prominent, as in the best Leicesters; but the hind quarters are square, full, and the ribs well sprung, giving a round body; the flanks are deep; the legs are clean, and of moderate length."—SHEPHERD'S MANUAL.

Cross-Bred Sheep. At the present time there seems to be more money in cross-bred sheep than in full "bred." The wool producing sheep are of slow growth and are slow in maturing. The "mutton" sheep are great eaters and require the most careful treatment. They have been so highly bred that they have weak constitutions, and are not as good breeders as the farmer would like. By a judicious cross there is still retained the quick growth, early maturity, and the good quality of the mutton. The sheep are more hardy, more easily kept, and produce more pounds of marketable mutton at a less cost than the pure "bloods."

The most conspicuous crosses are the Cotswold—Merino; the Southdown—Merino; the Leicester—Merino; the Cotswold—Leicester; and the Cotswold—Southdown.

HOW TO TELL THE AGE OF SHEEP AND OTHER USEFUL FACTS.

Teeth as an Indication of Age. The sheep has eight incisors or cutting teeth, which are all found upon the lower jaw. The remainder of the teeth, twenty-four in number, are divided among the upper and lower jaws equally. While there is a general rule as to dentition in sheep, yet there are few breeds that mature early, and what would be correct in judging the ages of one class of sheep, would not be accurate in another. The following are the accepted periods of dentition, and may be found useful in determining the age of a sheep :

At one month there are eight temporary front teeth or **INCISORS**, and three temporary **MOLARS** on each side of each jaw.

At three months there will be added a permanent **MOLAR** to the three temporary ones.

At nine months there will appear the second permanent **MOLAR**.

At twelve months the first pair of permanent **INCISORS** appear. This is often delayed till about the age of fourteen months.

At eighteen months the third permanent **MOLAR** appears.

At twenty-one months there will be four permanent **INCISORS**.

At twenty-seven months the temporary **MOLARS** drop out and permanent ones begin to show.

At thirty months there are six permanent **INCISORS**.

At forty months all the eight permanent **INCISORS** have appeared.

Relative Weight of Carcass. The result of experiments in which sheep were weighed before slaughtering, and the carcass weighed after, showed the value of dressed meat less the caul fat to be a little over one-half the live weight.

Ticks on Lambs and Sheep. Ticks often appear on lambs and sheep late in the spring, and are annoying to the animal and injurious to their constitution. The best remedy for this pest is to dip both the sheep and lambs into water into which coarse tobacco has been steeped, in the proportion of four pounds of tobacco to twenty gallons of water. When thoroughly steeped add one pound of flowers of sulphur. The liquid should be kept warm while dipping the animals, by adding fresh hot liquid. A temperature of 120° F. is necessary to kill the tick. The liquid that drips from the sheep should be caught and reheated and used again.

DISEASES COMMON TO SHEEP, THEIR CAUSES, PREVENTION, AND TREATMENT.

Constipation or Costiveness. This is more of a symptom of an approaching disease, than a disease in itself. It occurs occasionally upon flocks going from pasture to dry food. In such cases feed the animals a little linseed-cake meal or some succulent root. If stubborn, give one ounce of linseed oil, and inject warm soap and water.

When the costiveness is so severe or of so long standing as to cause the animal to stretch itself and stand with its feet spreading apart, raising its head and curving its back, give once a day one tea-spoonful of Flowers of Sulphur, mixed with a small quantity of molasses, which should be put on the animal's tongue to be swallowed.

Diarrhea or Scours. The opposite of costiveness. This is likely to occur upon turning sheep to pasture in the spring, or when fed rich succulent green food. This is not dangerous in itself, but may, by reducing the strength of the animal, cause complications. A regular supply of salt, careful regulation of food, and the avoiding of sudden changes will usually prevent this symptom of disease. Give two table-spoonfuls of the following twice a day, and if a lamb, about one-half the quantity, according to age :

4 drams Pulverized Ginger,
8 drams Catechu,
2 ounces Prepared Chalk,
1 dram Opium,

Mix with one pint peppermint water, and always shake the bottle before using.

The diarrhea may be caused by irritating substances in the intestines, and is shown by there being a slimy matter in the passages from the bowels. In this case the treatment should be to remove the irritating matter and therefore a physic should be given, as follows:

1 dram Ginger,
1 ounce Epsom Salts,
or,
1 dram Ginger,
2 ounces Linseed Oil.

Give the above in gruel. Follow the treatment by a careful nursing and feeding.

Diarrhea or "White Scours." In the nursing lamb diarrhea takes the form of a liquid discharge of a white color. The milk passes through the body without digestion, and to this condition is given the name "White Scours." This sometimes is caused by the milk of the mother being changed by feeding upon some succulent food. In such cases change the food of the ewe to a more solid and nutritious food. If it comes from a disordered condition of the digestive organs of the lamb, give the following physic :

5 drops Essence of Ginger,
1 tea-spoonful Linseed Oil.

As soon as it has operated, give two tea-spoonfuls of the following twice a day :

1 ounce Prepared Chalk,
 $\frac{1}{2}$ dram Opium,
2 drams Powdered Ginger,
4 drams Powdered Catechu.

Mix in one pint of peppermint water. Always shake well before administering.

Dysentery. Many people are not able to distinguish the difference between diarrhea and dysentery, yet they are two different conditions and require different treatment. They are often induced by the same conditions but the discharge from the bowels is of a different character. In dysentery there is more or less fever according to the severity of the case. The dung mixed with mucus and blood shows that the lining of the bowels is inflamed. The discharge is frequent, lumpy and scanty and has a fetid smell. The voiding of the discharge is attended with pain, causing the sheep to arch its back and moan. The wool often loosens from the pelt after the disease has been running a short time.

The treatment for this disease is to first remove the contents of the bowels, together with some anodyne to ease the pain. The following may be given mixed in oat-meal or linseed gruel:

2 grains Powdered Opium,
2 ounces Linseed Oil.

Give oat-meal gruel as a nourishment quite frequently during the day, and then follow for several days with daily doses of the following:

2 grains Powdered Opium,
1 dram Ginger.

If the bowels do not become regular or are constipated give one ounce of oil every other day.

This disease is induced by dry indigestible food; impure water; a lack of water; neglected diarrhea: and feeding in a pasture in warm weather; that has been occupied by sheep that have had this disease, the sheep taking the poison from the grass that has been contaminated by their discharges.

Inflammation of the Bowels. This is not a common disease in this country, but occurs occasionally as the result of continued indigestion or bad feeding and bad water in warm weather. The disease makes its first appearance by weeping and redness of the eyes, and a tired and pained expression to the face. There is a loss of appetite and no rumination (chewing of the cud). There is weakness and staggering, swelling of the flanks, high fever and difficult breathing.

To prevent its spread, if it once makes its appearance, change the pasture to high grounds and supply plenty of pure water. It is not contagious and only spreads when conditions favor the disease. When the sheep are put back in their old pasture, as a preventive give them salt which has had one ounce each of the sulphate of iron, powdered gentian and powdered ginger mixed with every six pounds.

To cure, give an ounce of Linseed or Castor Oil, or Epsom salts, and follow after it has operated with one dram doses of the Sulphite of Soda, twice a day. The food should be glutinous and semi-liquid, such as oatmeal or linseed gruel. Unless the animal is very valuable, it is a question whether it will pay to attempt a cure in a serious case, as the recovery is slow, and the debility caused by the disease is of itself often fatal.

Hoven. This is a disease common to ruminants and as the sheep is one of this class, it, like the others, is subject to the disease. It arises from the forming of gases by the food that is in the first stomach or rumen. This gas collects in such large quantities that the rumen (paunch) is so distended that it presses forward against the diaphragm and interferes with the action of both the heart and lungs. It shows itself outwardly by a distention of the left side of the abdomen, by which the skin is tightly drawn until it seems in danger of bursting.

Treatment. An alkaline that will absorb the gas is the best treatment. The best alkaline fluid that can be given is as follows:

1 tea-spoonful Aqua Ammonia, (Hartshorn Water),
 $\frac{1}{2}$ pint Water.

This should be given as a drench. A rubber tube of the proper size should be kept on hand to be used as a probang. This could be forced

down and the gas could escape through the opening, and the alkaline fluid could also be administered through it. If necessary an opening may be made through the rumen with a small bladed knife if a trochar and canula are not at hand. If a knife is used a goose-quill should be inserted into the opening made, to allow the gas to escape. The alkaline fluid could also be injected through the quill in the rumen by use of a common syringe. The opening should be made at the place where the greatest swelling is apparent.

After the gas has somewhat subsided give with a horn, the following:

1 pint Water,
1 dram Powdered Ginger,
2 ounces Epsom Salts.

If the gas still continues give a dram of chloride of lime.

Cold or Catarrh. This disease is caused by exposure to dampness, sudden changes in temperature, or too warm a shed or pen. If your flock is very carefully housed and then exposed by open doors, or letting out into the yard, you may look for catarrh.

Protect your sheep from chilling rain-storms in winter, give them plenty of ventilation, but no draft of cold air. Partly open sheds are to be preferred to closed ones with open windows and doors for ventilation. Chasing by dogs, or overdriving, thus overheating the animal, is a certain cause for colds.

The disease is an inflammation of the mucous membrane, lining the throat, windpipe, and nostrils, and the sinuses of the head. It is the same as a "cold" in man. There is a mucus discharge from the nose, caused by congestion of the membrane, and irritation and coughing.

Treatment. Give something to stimulate action, as a half teaspoonful of ground ginger. A small quantity of pine pitch or tar rubbed on the nose, so that the sheep will lick it off, is beneficial. Usually there is a fever and the nose is dry and hot, when it is best to give

1 dram Ground Ginger,
1 dram Saltpeter,
 $\frac{1}{2}$ ounce Epsom Salts.

Mix with molasses and give as a soft mixture. The dose may be mixed with thin gruel and administered by means of a small drenching horn.

Be sure and give good nursing and feed on slightly warm mucilaginous drinks, as linseed or oat-meal gruel.

Bronchitis. This a catarrh or cold that has settled on the air passages in the lungs or bronchial tubes. This inflammation will rapidly spread so as to affect the lungs. The cough is more prominent than in a "cold in the head" or "throat." The pulse and breathing are quicker and there is a fever and poor appetite.

Treat same as for Cold or Catarrh, but continue longer and change the dose to the following if the first does not seem to cause improvement.

1 ounce Linseed Oil,
1 ounce Powdered Gentian,
1 dram Saltpeter.

Mix and give one dose a day for three days, reducing the last day the amount of saltpeter to one-half dram. Keep animal dry and quiet, with plenty of fresh air and pure water.

Inflammation of the Lungs. This is pneumonia and is quite common. Often the sheep is too far gone with pneumonia before the owner is aware that his sheep is sick. This disease to be cured requires immediate and proper treatment or it will prove fatal.

Symptoms. There is a difficult and painful cough; a discharge of a thick yellow mucus from the nostrils; a high fever attended with great thirst; a hard, quick pulse; labored breathing and painful heaving of the flanks; together with a loss of appetite.

Treatment. This is of no avail unless commenced immediately. Bleed from the jugular vein, till animal staggers and give immediately two ounces of Epsom salts. If this does not operate as a good physic, in three hours give one-half a dose. Unlike the horse, the sheep seems to do better with a good purging. Give rectum injections of oat-meal or linseed gruel every two hours. Administer twice a day in gruel of some kind.

20 grains Tartar Emetic,
20 grains Powdered Digitalis,
1 dram Nitrate of Potash.

When the animal improves and moves about, give every four hours in gruel, half dram of powdered Gentian. This disease in sheep as well as in man is the result of carelessness, and by proper care and attention can be avoided.

Influenza. This disease is due to causes which seem to exist at times over extended portions of the country, and is liable to affect a large number of animals at a time. It is not contagious, but breaks out

and spreads under conditions that are favorable to its propagation.

It is an inflammation of the mucous membrane lining the nasal and bronchial passages, which is accompanied with fever and prostration. The whole system seems disturbed. There is redness of the eyes; running at the nose; indigestion, causing loss of appetite; a cough; and great weakness. It is generally prevalent after a few days of cold, damp weather, and is most severe along river bottoms, where fogs and mists abound. During such weather carefully house and shelter the flocks, and feed them some salt in which sulphur has been mixed in the proportion of one pound of the flowers of sulphur to a peck of salt.

If the disease is mild, give the following purgative :

$\frac{1}{2}$ ounce Epsom Salts,
1 dram Ginger.

Mix in molasses and give by putting a small quantity at a time on the back of the tongue with a wooden spatula.

If the animals are seriously affected, give every six hours,

1 ounce Solution of Acetate of Ammonia,
8 drops Tincture of Aconite.

At the third dose give only five drops of aconite, at the fourth only three, and then give the aconite of ammonia alone. When convalescent, feed on bran and linseed mashes, boiled Indian-corn mush, with a little powdered ginger or gentian mixed in each mess.

Congestion of the Liver. This is caused by excessive feeding of stimulating food and no exercise, in which case the liver is liable to become gorged with blood. This excessive fullness of blood causes congestion. It is caused by disordered digestion and involves the liver. The symptoms are constipation, yellow tinge to the eyes, and dullness. If the yellow tinge in the eye appears, do not delay treatment or it may run into inflammation of the liver.

Give an active physic every morning until the yellow tinge in the eye has disappeared, and there is an improvement in the appetite. The following purge may be mixed with molasses and given:

3 grains Calomel,
1 ounce Epsom Salts.

Always supply the sheep with a warm drink soon after giving the medicine.

Inflammation of the Liver. By neglect, congestion of the liver may turn to inflammation. When this happens the system becomes fevered; the nose and mouth hot and dry; the breath fetid; the ears

cold; the eyes pale and glassy; the pulse is irregular; breathing is slow, and the expirations short and sudden; the dung is dry, hard, black, and glazed with a greasy yellowish-green mucus; the urine is highly colored, scanty, hot, and smells disagreeably. Pressure on the right side, near the short ribs, produces pain, and the animal moans.

The treatment consists of purgatives and injections. For a purgative the following may be given twice a day in infusion of linseed or gum Arabic, or in molasses, well mixed together and placed on the tongue :

2 drams Sulphate of Potash,
5 grains Calomel,
1 grain Powdered Opium.

Injections of warm water and castile soap may be given until the bowels act freely.

When improvement occurs, and the appetite returns, great care in feeding should be observed, and only the most easily digested food should be given. Pulped sugar beet, scalded clover-hay, chaff, linseed-meal, boiled meat, or sifted corn-meal, may be given with linseed tea for drink, or water acidulated with a few drops of aromatic sulphuric acid.

Poisoned by Sheep Laurel. The narrow-leaved *Kalmia*, (*Kalmia angustifolia*) is commonly called sheep laurel, because at certain seasons of the year the sheep seems tempted to eat of the plant, which often proves fatal to them. When poisoned by this plant they are lazy, disinclined to move, froth at the mouth and nose, have a slower pulse than usual, blood-shot eyes and a staggering gait. Laurel poisoning is usually fatal within ten or twelve hours, and therefore immediate attention is necessary. Give at least two ounces of Epsom salts in a pint of warm water, and give a pint of warm water every hour thereafter for three or four hours. Use rectum injections of warm soap suds or oil, which will help the poisonous matter to pass out of the bowels. Sheep should not be allowed during the spring or winter to pasture where a laurel grows. Beside the common sheep laurel, they will also feed on the large leaved laurel, (*Kalmia latifolia*).

Injurious Effects of Plaster and Lime. It is very injurious to sheep to turn them upon a pasture that has been freshly sown with phosphate, bone-dust, plaster or lime, until there has been sufficient rain to thoroughly wash these from the grasses.

Inflammation of the Bladder. This is the most frequent of the diseases of the urinary organs. It is induced by eating too often and

too much corn meal, or drinking very hard water. The eating of St. John's-wort, rag-weed, and lobelia is often the cause of the disease.

It is an inflammation of the inner coat of the bladder, which usually spreads to the muscle around the neck of the bladder, causing it to close and prevent the passage of the urine. The bladder being thus filled causes the animal to be uneasy, lift its hind feet and stamp with them, spread them out, and strain itself in endeavoring to pass urine. As the animal strains in its efforts to void the urine, it will moan in pain.

Bleed the animal from the neck, and give the following :

2 ounces Laudanum,
2 ounces Linseed Oil.

If it is a small sized sheep or lamb, reduce the dose accordingly. If the animal does not improve in forty-eight hours, bleed again and give a half dose of the above and continue giving one dose a day until the animal has improved.

Feed for some time on light mucilaginous foods, as oat-meal or linseed gruel.

Inflammation of the Brain. This is caused by continued high feeding or some condition of the digestive apparatus which causes a "rush of blood" to the brain. It seldom appears only as a secondary condition which has at first produced what is commonly called Staggers. The animal is apparently temporarily blind, staggering about and running against walls and fences. The eyes are inflamed and swollen. By giving a purgative of Epsom Salts, and mucilaginous diet, the animal usually returns to its normal condition. If not and it runs into inflammation of the brain, the symptoms are much more exaggerated. The animal dashing here and there as if mad, and finally falls down and dies in convulsions. The remedies are not very successful, but copious bleeding and purging with Epsom salts may relieve the animal and effect a cure.

Water on the Brain. This a disease for which there is no cure, and if a sheep is attacked it is best to dispose of it. If in a lamb, it is not worth trying to raise. This disease is hereditary and if found in any great numbers in a flock of lambs, the ram should be changed. If it arises from the mothers, fatten them for the butcher.

Staggers. See Inflammation of the Brain.

Diseases of the Feet. The foot of the sheep is subject to many disorders. The formation of the foot is unlike that of the horse, because there are no layers of horn between the outside crust and the tender tis-

sues inside. Its growth is not like that of the horse, which grows from the coronet downward, but grows from all parts of the inner tissues. The outside crust is worn off to an edge by contact with the ground, and if the sole and crust are worn equally, it shows the foot to be in a healthy condition. But if the growth is unequal it shows that disease is present.

Contagious Foot-Rot. This disease is very contagious, and unless preventive measures are taken to stop its spreading, will often infect the whole flock. In this disease there is an inflammation which seems to affect the whole hoof. Blisters form between the toes and upon the heels. These blisters in a few days ulcerate and discharge a fetid matter. This disease is usually confined to the fore-feet, the animal showing how painful the disease is by going about upon its knees. If nothing is done to stop the disease, in a short time the hoofs are all destroyed, and the animal is left with only wounded stumps.

Commence treatment, if possible, before ulceration sets in, because after this has commenced it takes a long time to cure the animal. As soon as a case of lameness appears, examine for its cause. It may be a case of common Foot-rot or Gravel, (which see, for a description of its symptoms) or a case of Contagious Foot-rot. If the latter, remove all loose, raw, diseased horn, by cutting it away. Should the outside horn be long at the toes, that too should be cut away, and if any pus is found between the horn and the underlying tissues, the horn should be cut away until it is exposed. At least twice a week clean the feet by washing them in water in which carbolic soap has been dissolved, and after the thorough washing swab them thoroughly with the following mixture.

1 ounce Arsenic,
6 ounces Acetic Acid,
 $\frac{1}{2}$ pound Oxide of Copper,
1 pint Molasses.

If more convenient, or if an ointment is preferred, use the following :

1 pint Linseed Oil,
1 pound Powdered Sulphate of Copper,
 $\frac{1}{2}$ pound Verdigris,
1 quart Pine Tar.

This is to be preferred in wet weather, as it will not wash off like the solution by travelling in the wet grass. This disease is seldom seen on dry pastures, except it is brought there by some flock that was affected,

therefore to cure, keep the sheep in dry pastures. It is said that sometimes this disease is contracted by sheep being put into the same pasture where sheep were grazing even the year previous.

Common Foot-rot or Gravel. This is not contagious, and is due to the excessive wear of the horny part of the hoof, caused by walking upon hard gravel or stony land, or by this crust of the hoof growing too long in soft, moist pastures. In either case, gravel or some other foreign matter gets between the crust and the underlying tissues, and causes inflammation.

Remove the gravel or other foreign matter carefully, by means of a sharp knife, or a knitting needle or awl. Then cleanse the foot and put on the following antiseptic wash:

1 ounce Chloride of Zinc,
1 quart Water.

Blue vitriol may be used in the place of the chloride of zinc, if more convenient. If the case proves very bad and ulcerates, the wash used for contagious foot-rot should be applied.

The Sheep Gad-fly. This is a very annoying animal and causes that disgusting condition, "Grub in the Head." The gad-flies during July and August disturb the sheep by trying to deposit their eggs upon the sheep's nose. Where the fly is in great numbers the sheep will crowd together, stop feeding, and hold their noses to the ground, stamp the feet in their efforts to evade this pest. The fly has a body about one-half inch long, over which is spread two wings which will, when extended, measure one inch across. The egg, is deposited on the sheep's nose, and as soon as hatched the grub crawls up the nostril and remains in the sinuses of the head, living on the secretions of the mucous membrane till the next spring, when it is ready to crawl down and out, to form a chrysalis which in time will hatch a new gad-fly to deposit its eggs on the nose of the innocent animal. In entering the nostrils and on leaving them the grub causes a great annoyance to the sheep. The remedy is to prevent the fly from laying its egg on the nostril, or destroying the egg if deposited. This is successfully accomplished by smearing the nose of the sheep every day or so during the months of July and August with pine-tar diluted with oil, lard, or fresh butter. This can be easily done by a brush as they pass out from a yard through a long narrow passage only wide enough for one to pass through at a time. When the grub gets ready to dislodge in the early

spring, an injection of good strong tobacco smoke will cause it to quickly crawl out from its lodging place.

The Sheep Louse. The red sheep-louse, (*trichodectes ovis*) has a pale yellow body marked with dark bands, but a head of red color. This animal lives on the inner, upper parts of the fore and hind legs. It irritates and annoys the sheep very much, and the sheep will force its head through between the boards of a fence, so that it can rub the irritated part, and they will often be found impinged and strangled or with the legs broken in their attempts to again become free. Sheep that have been dipped in tobacco and sulphur water to be cleared of ticks, are usually free from this pest. An easy remedy is to rub the parts affected with the following:

2 ounces Flowers of Sulphur,
1 pound Adeps, (Lard),
2 drops Creosote.

One pint linseed, olive, or sweet oil may be substituted for the lard.

Scab Insect. This is an external parasite which digs down into the skin and finds for itself a lodging place within its tissues. The presence of the insect causes an irritation of the skin, which in its efforts to dislodge the parasite secretes a serous-like fluid, which on drying on the surface forms a scab, hence the name "scab-insect." The female insect is larger than the male, and one male suffices for many females and lives longer. The eggs of the scab-insect are very numerous, and it takes only three days to hatch, so one female insect can produce over a million in ninety days. This wonderful increase explains why the disease spreads so rapidly through a flock, and the need of instant remedies to drive out and effective preventives to keep it from spreading.

Symptoms. There is at first great uneasiness, and as the disease progresses the sheep will be seen rubbing or scratching themselves, or sticking their noses in the wool, biting and nibbling. The skin will be at first white in color and a little swollen, which is indicated by being thicker than the rest of the skin, and moist or covered with a yellow serum. Later the serum forms into a scab and the wool falls off. If a lock of this wool is examined by laying it upon a piece of white cloth, the mites can be seen as they crawl upon it. If the insects are allowed to increase in number the scabby spots will increase in size and number, and great patches of the wool will fall off, leaving bare spots on which thick brown or yellow scales are seen, and the sheep will be found rub-

bing these bare places against trees and fences till they become great sores.

Treatment. Many preparations have been tried and found effective, but many are objectionable on account of their poisonous properties. The tobacco and sulphur wash recommended for sheep tick is a reliable remedy. The water should be applied at a temperature of 120° F. and the sheep kept in the liquid until the wool is penetrated down to the skin. This softens the scab, and as they are removed (which should be done with care) the raw surfaces should be thoroughly wet with the mixture. Do not let the sheep out on the pasture till the water has ceased dripping, because the tobacco and sulphur might sicken the animals that ate the grass which it had fouled. Repeat the operation after ten days to kill any newly-hatched insects. With care the animals can be thoroughly rid of this parasite, and they can be kept free from them as well as the sheep-tick and sheep-louse by dipping twice a year.

Castration. "This necessary operation should be performed as early as possible, as there is less danger of evil effects following it than when the lamb is older. The lining membrane of the scrotum is a continuation of that of the abdomen, and when inflammation follows the operation, it is readily communicated to the abdomen, and peritonitis or inflammation of the membrane lining the cavity and enveloping the bowels results, and this is generally fatal. A lamb a week old may be deprived of the whole scrotum and testicles, by one stroke of a pair of shears, without any danger or the loss of more than a few drops of blood. But when the lamb has become some months old, the organ has become fully developed as to nerves and vessels, and a more careful operation must be performed. An excellent method is for the operator to sit upon a long bench, with one of the lamb's hind legs beneath each of his thighs, the head and fore legs being held by an assistant. Taking the scrotum in the left hand, he presses the testicles towards the lower end, making the skin tight and smooth. He then makes a free incision with a sharp knife at the bottom of the scrotum beneath each testicle; the membranes which surround them are cut through, the cords and vessels which are attached to them are scraped, not cut asunder, and the operation is completed. To castrate a mature ram, an incision is made at the bottom of each compartment of the scrotum, each testicle being removed separately, the cords and vessels being always scraped asunder. The main point to secure is, to have the wound at the bottom of the scrotum, so as to allow the pus, which will form within it, to escape. If this pus is re-

tained in the wound, it becomes absorbed, inflammation is communicated to the adjacent parts, and a fatal termination is likely to ensue. To prevent this, a small lock of wool is sometimes left in the wound, by which it is kept open and the danger averted."—STEWART.

Docking. "This operation should be performed on all the lambs when a week or two old. It is then but slightly painful. The best method is to take the lamb between the knees, and hold its rump closely against a block of wood. Then drawing the skin of the tail towards the rump; a boy gives the chisel a smart rap with a light mallet, and the tail is severed at one stroke with a smooth cut which leaves the bone in a good condition to heal quickly. A pinch of powdered copperas may be placed on the stump of the tail to staunch any bleeding, and to keep off flies."—STEWART.

How to Feed a Lamb. A twin lamb, or one deprived of its dam, that may need to be reared by hand, may easily be fed upon cow's milk. A fresh cow's milk is the best fitted for this purpose. Ewe's milk is richer in solid matter than that of the cow, and the addition of a teaspoonful of white refined sugar to the pint of cow's milk will make it more palatable to the lamb. At first not more than a quarter of a pint of milk should be given at once. The milk should be freshly drawn from the cow, and warmed up to 100° F. before it is fed. A convenient method of feeding milk to a lamb is to use a small tin can with a long spout, such as is used for oil. An air-hole is punched in the cover or cork and a piece of sponge covered with a cloth is tied upon the end of the sponge. The flow is then made easy and equal and the lamb sucks in an easy manner. A very short time is sufficient to familiarize the lamb with this kind of foster mother.

The Association of Dogs with Sheep. It is a common practice among many farmers who have a large herd of sheep, to keep a dog to assist in driving and caring for his flock. There is a breed of dogs which is very useful for this purpose, and if it was not for the fact that dogs are infested with tape-worms they certainly would be a very desirable animal to have on the farm.

Dogs, beside the annual slaughter of very many valuable sheep, cause death by transmitting to sheep a form of tape-worm. The eggs of the tape-worms are discharged in the dung of the dog upon fields and pastures and are swallowed by the sheep with the green pasture, and the worm is developed in the body of the sheep, either in the lungs, the abdomen, or the brain, causing a disease which prevents the sheep from

thriving and often causes death. The larva of this tape-worm is a small watery bladder, or sac, which contains the undeveloped worm. There are two general varieties of these worms, one the intestinal tape-worm, which is very rare, and the bladder worms, of which there are three kinds. Of these bladder worms one variety, the diving bladder-worm, inhabits the abdomen; another variety, the many-headed bladder-worm finds a home in the liver; while the third inhabits the brain, and are called the brain bladder-worm.

Diving Bladder-Worm. These worms are found free in the abdomen; enclosed in the adipose tissue (fat); and attached to the liver and intestines. They vary in size from a hickory-nut to a hen's egg. They sometimes are found as large as a goose's egg. These bladders when fed to a dog, produce the mature *tænia marginata* (tape worm) about three feet in length in about three months. Then the sheep or lambs eating the eggs of this worm produce the hydatids or bladder-worms. If they are taken into the body in large quantities the animal will soon die.

Many Headed Bladder Worms. This parasite finds a home in the lungs and liver of the sheep and other ruminants and also is found in man. It is a most dangerous parasite, because if it is taken into the human stomach it may produce "bladders" in the brain. They grow by a budding process and rapidly increase. It is most commonly found in the brain. When the head of a sheep containing the bladder-worms is eaten by a dog the larvæ is changed into tape worms. This worm or its eggs pass out of the body of the dog upon the grass of the pasture and the eggs are swallowed by the sheep. These eggs are hatched in the stomach and go to all parts of the body, perishing everywhere but in the brain, which is its usual habitation. They chiefly affect lambs, old sheep seeming to be rarely inconvenienced by this parasite. One infested dog will produce thousands of eggs. To prevent the disease, do not let the heads of sheep be devoured by dogs or hogs. Burn the heads of the sheep that have died from the malady.

The presence of this parasite produces what is commonly known as giddiness or turnside in which the sheep turns its head to the right or left and walks around in a circle in the direction in which the head is turned until it falls giddy and exhausted.

The location of the worm may be determined by a "soft spot" on the skull. The worm causes absorption of the substance and the soft tissues may be easily felt by pressure of the finger. The treatment consists in inserting a curved awl through the skull and piercing the bladder. The

water then escapes and is absorbed, leaving the worm to perish.

Hair-Worms in the Intestines. A species of "hair-worm" called from its peculiar formation *TRICOCEPHALUS*, is not uncommon in sheep. It infests the stomach and intestines, causing obstinate diarrhea, and rapid wasting of flesh. These worms burrow their heads into the membrane lining the organs, which submits to no treatment while they remain. A cough is often present along with the diarrhea. Other species of worms, of habits identical with these, and producing the same injurious effects, also infest the sheep, but more particularly lambs and yearlings. Salt in doses of half an ounce, given on alternate days with one dram doses of sulphate of iron, the salt being given on one day and the iron the next, is a very sure remedy for this class of parasites, and the disease which results from their presence. To counteract the debilitating effect of these parasites, the food should be of the most nutritive and digestible character, and linseed in some shape should not be omitted.

Tape-worms, or *Tænia Plicata*. The sheep themselves are sometimes infested with mature tape-worms. This is easily explained by the possibility of the sheep swallowing along with their pasture some of the eggs which may have been voided by any of the numerous bearers of these worms, both domesticated and wild.

Generally the symptoms developed by the presence of tape-worms are voracity of appetite, alternating with a refusal of food; loss of condition, desire to swallow earth, stones, sand, or ashes; the passage of soft dung, mixed with mucus, which becomes attached to the vent and tail, causing a very filthy condition; and the evidence of internal pain. The sheep finally dies greatly emaciated. There is no means of prevention, as the eggs may be dropped by rabbits, squirrels, skunks, and other wild animals which frequent the fields. The treatment most effective is to administer turpentine as follows:

2 ounces Linseed Oil.

$\frac{1}{2}$ to 1 ounce Spirits of Turpentine.

This should be repeated twice a week for two weeks. If this is not effective, three ounces of the Powdered root of Male Fern may be given. The dose to be repeated in one week. In six hours after this is administered, a purgative of linseed-oil should be given. The food should be of the best kind until the lost condition is restored.

Tape-worms in any of their forms of life, affect only young sheep and lambs. When sheep attain the age of two years they are safe from them, and it is very rare indeed that one older than this becomes infested with them.

Lambs and Their Diseases. "The diseases to which lambs are subject are but few, and those are mainly the result of carelessness in their management. The lamb, which appears so delicate and tender an animal, is really hardy, and resists much ill treatment, else with so little consideration as they usually receive, the race would soon become almost extinct. Damp and cold are especially to be guarded against in the spring, and filthy yards at all seasons. With clean pens and dry, clean bedding, they will resist the severe dry colds of a northern January, and thrive and grow while snow storms rage, if only well sheltered. Sunshine has a remarkable effect upon lambs, and the warmth of the sun will often revive and strengthen a weak lamb that appears past relief. Extremes of damp and impure air in close pens, and bad drinking water, will produce diarrhea and paralysis, and these are the chiefly fatal disorders to which they are subject. Constipation is produced by want of proper laxative food, and permitting them to feed on dry, withered herbage that has lost its nutritive qualities beneath the storms of a winter. If, notwithstanding all possible care, some weakly lambs are found to require treatment, the simple purgative (a teaspoonful of castor or raw linseed oil) will be found effective, after two or three doses, in removing the troublesome matter from their intestines, and restoring the bowels to healthful action. If in any case, a stimulant seems to be needed, as when great weakness and prostration are present, the safest is a teaspoonful of gin, given in a little warm water with sugar. A still more gentle stimulant and anodyne, but one very effective in prolonged diarrhea, is prepared by adding to a pint of peppermint water, one ounce of prepared chalk, a tea-spoonful each of tincture of opium and tincture of rhubarb; it is worthy of the name given to it by shepherds, viz: "lambs cordial," and at the lambing season no shepherd should be without a supply of it. The dose is a tea-spoonful for a lamb of a few days old, up to a table-spoonful for one of a month. Exposure to cold rains should be guarded against, and if by inadvertence a lamb is found chilled and rigid from such exposure, it may generally be restored by means of a bath of warm water and a tea-spoonful of warm sweetened gin and water. After the bath the lamb should be gently dried, wrapped in a warm flannel, and placed near a fire or in a wooden box in a gently heated oven of a common stove. Where the flock is large, and the kitchen is not within reach, the shepherd should have the conveniences of a shed and an old cooking-stove in which he can keep a fire sufficient to heat the water bath, and provide a warm bed in the oven for any

lamb that may need such attention; if the flock numbers several hundred head in all, there will seldom be a day in our changeable spring seasons when there will not be one or more patients to be treated.”—ALLEN.

Constipation in Lambs. This occurs quite frequently with lambs, and when constipation is present, the dung is scanty and passed at long intervals in glazed hard lumps. The lamb shows pain during passage by arching its back and a peculiar but expressive action. To relieve every six hours inject into the rectum warm water which has been mixed with a half-ounce of linseed-oil. Two or three injections are usually all that will be necessary. Feed the lamb on linseed gruel, sweetened with molasses.

Spasmodic Colic in Lambs. This is shown by severe pains, occurring spasmodically. The lamb falls and struggles, or remains with its eyes fixed. This generally accompanies constipation and always indigestion. To relieve the spasms give the following mixture with a spoon: one dram tincture of Rhubarb; one dram carbonate of soda; two ounces of warm water sweetened with molasses. After the spasms are relieved, give half an ounce of linseed-oil.

Weaning Lambs. Do not remove the lambs from their dams abruptly. It is injurious to both. It forces the lambs to load their stomachs with food which they are not strong enough to digest, thereby causing them to stop growing by a stinting of food and a nervous irritation consequent upon their sudden deprivation. The dams in full flow of milk being deprived of relief, are liable to have the udder engorged which is followed by congestion. This shock is very injurious and consequently produces inflammatory disorders of the blood or garget. To avoid these ill effects of a sudden change, remove the lambs to another pasture, quite a distance away, giving them as companions the dry ewes and wethers of the flock. A new pasture will cause them to forget their dams and they being so far distant that they do not hear their bleating, will remain quiet. At night turn them into the fold with the ewes whose full udders they will soon relieve. Place the ewes on a short pasture and deprive them gradually of any extra food hitherto given them and in a couple of weeks their supply of milk gradually decreases, and the lambs may be weaned with perfect safety to themselves and the ewes.

“After having been weaned, the lambs should have the first choice of pasture and the best and tenderest cuttings of the fodder crops. Many

farmers have found it advantageous in every way to turn newly weaned lambs into a field of corn in the month of August. The corn is too far grown to be injured, the suckers only will be nibbled by the lambs, and the weeds which grow up after the corn is laid by, will be eaten closely. The lambs also have the benefit of a cool shade, and where such a field can be conveniently applied to this purpose, there are several reasons why it might well be done.

The condition of the ewes must not be neglected at this time. The chief danger is in regard to those that are heavy milkers. Such sheep should be closely watched, and the milk drawn by hand from those whose udders are not emptied by the lambs. The first approach to hardness or heat in the udder should be remedied by an immediate dose of an ounce of epsom salts dissolved in water, and mixed with a tea-spoonful of ground ginger. The next two days twenty grains of saltpetre should be given each morning and evening, to increase the action of the kidneys. These remedies will generally relieve the udder, and will tend to greatly reduce the secretion of milk. If hay is given in place of grass, and the ewe confined in a cool darkened pen, the drying up of the milk will be hastened."



SWINE.

CHARACTERISTICS OF THE VARIOUS BREEDS.

Their Diseases and How to Cure Them.

ROOTING, AND ITS PREVENTION, SOWS EATING THEIR PIGS, CURING AND PRESERVING, SWINE BREED- ING AND FEEDING.

THE importance and value of the swine to the people of the United States is shown by the statistics of the last census. Here by carefully prepared tables the income is shown to be equal to that derived from the sale of cattle. There are few people who are aware that nearly one-half of the swine in the world are reared and fattened in this country.

Nearly every farmer keeps a few swine, to which he feeds much of the by-products, which would otherwise go to waste. Others produce for the market, and it is of importance to them to get as much profit out of the few or many as possible. This can only be done by a thorough understanding of the peculiar characteristics of the various breeds and the advantages to be derived from each variety. Then studying the conditions about which you will be compelled to surround your animals, you can determine the value to you of the various breeds. It is certainly a well established fact, that a breed exactly suited to the wants of farmers in one locality, might not be suited to the needs of those in other portions of the country who make pork for a different purpose and under widely different circumstances and for different markets. And further the man who raises only one or two pigs for his own consumption, and keeps them the whole of their lives in a small pen, wants a different breed from the man who has large hog pastures.

The Berkshires. From 1820 to 1833 this breed was largely imported into the United States and sold at exorbitant prices. But the careless neglectful system of farming then so common, caused the breed to lose the good qualities given them by the English, who at that time gave them careful management as regards both their breeding and feeding. The breed so deteriorated that the farmers became prejudiced and for years afterwards would hardly accept a Berkshire as a gift.

But at the close of the Civil war new importation of the finest specimens of English bred Berkshires that could be found, were made. The character of farming having changed from back-woods to more modern, and the good qualities of the Berkshires becoming known, they have become as popular to-day as they were despised sixty years ago.

Their good qualities may be stated as follows:

Great vitality, which renders them less liable to disease than many other breeds.

They have great muscular power and are very active.

They have good digestive and assimilating power. They therefore return a large amount of fat and flesh for the quantity of food eaten.

The sows are careful mothers, good sucklers and are very prolific.

The pigs at birth are strong and active and therefore are not liable to mishaps.

They are easily fattened at any age for market, yet can be fed to any reasonable weight.

Their flesh is of a very fine quality.

They are uniform in color, markings, and quality.

The male when used as a cross transmits the good qualities of the breed to its progeny.

Characteristics. The "Swine Breeders" Convention at New York gave the following as a good description of the characteristics and markings of the Berkshires: Color black, with white on feet, face, tip of tail, and an occasional splash of white on the arm; while a small spot of white on some other part of the body does not argue an impurity of blood, yet it is to be discouraged to the end that uniformity of color may be attained by breeders; white upon one ear, or a bronze or copper spot on some part of the body argues no impurity, but rather a reappearance of original colors. Markings of white other than those named above are suspicions, and a pig so marked should be rejected.

Face short, fine, and well dished, broad between the eyes; ears generally almost erect, but sometimes inclining forward with advancing age, small,

thin, soft, and showing veins; jowl full; neck short and thick; shoulder short from neck, to middling deep from back down; back broad and straight, or a very little arched; ribs—long ribs, well sprung, giving rutundity of body; short ribs of good length, giving breadth and levelness of loins; hips good length from point of hip to rump; hams thick, round, and deep, holding their thickness well back and down to the hocks; tail fine and small, set on high up; legs short and fine, but straight and very strong, with hoofs erect, legs set wide apart; size medium; length medium, extremes are to be avoided; bone fine and compact; offal very light; hair fine and compact; skin pliable.

The Bershires are hardy, prolific, and excellent nurses; their meat is of superior quality, with fat and lean well mixed.

Size. There have been improved Berkshires, both in England and America, whose dead weight, dressed, occasionally exceeded eight hundred pounds; but the general weight, full grown, is from three hundred to six hundred pounds, according as the smaller or larger pigs are selected from the litters for fattening, and as they are subsequently fed and attended. The smaller sizes mature several months the quickest, and are preferred in the markets for fresh pork; and for curing also, for those who are particularly nice in the choice of their meat, find their meat more tender and delicate than the larger animals.

Quality of Meat. The meat of the improved Berkshire, like that of the unimproved, abounds in a much greater proportion of sweet, tender, juicy lean, well marbled with very fine streaks of fat, than other breeds of swine; but the former is far more delicate now, than the latter ever was. This renders the whole carcass the most suitable of all for smoking. The hams and shoulders almost entirely lean, a thin rim of fat covering only the outside.

Maturity. The improved Berkshire can be fattened at any age. Barrows mature in twelve to eighteen months, according as selected from the litters, whether the largest or smallest, and as subsequently fed and treated. It takes boars and sows reserved for breeding about six months longer to get their fullest size and weight, as they are not pushed by high feed so rapidly as those destined for more immediate slaughter.

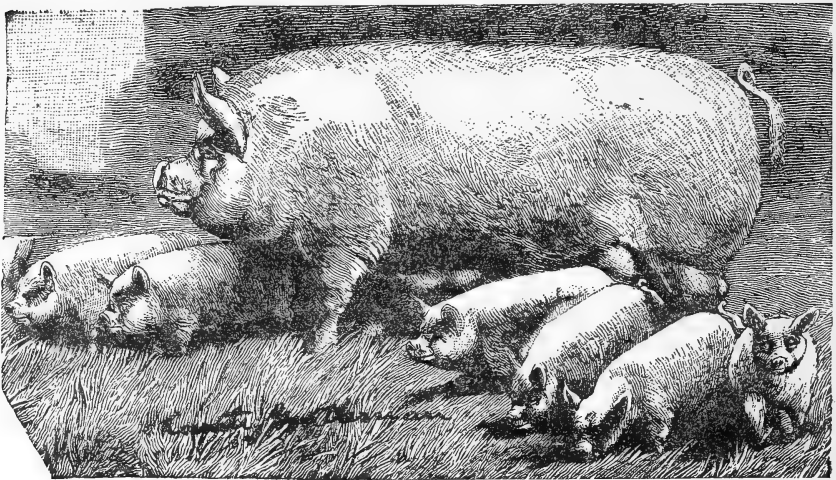
The Suffolks. F. D. Coburn, in "Swine Husbandry," has the following to say regarding this breed:

"The Suffolks are not raised pure, or used as a cross in the principal pork producing States so extensively as several other breeds, nor are they so well known to a majority of farmers, who have a belief, if not

positive knowledge, that they are rather delicate, and difficult to raise.

The objections to them are, that they are not large enough, not satisfactory as breeders and nurses, and that their skins are too tender, and thinly haired, to withstand the exposure to which the average farmer's hogs are subjected.

As to size, the best strains of Suffolks are large enough for those who prefer to raise hogs of medium weights, while for quietness and easy keeping qualities, no breed of swine can excel them, and to those who like pets, we would recommend a cleanly-kept Suffolk pig in preference to any "poodle," or other diminutive canine we ever saw. The sows



FIRST PRIZE ENGLISH MIDDLE-WHITE SOW.

are not so prolific, so regular as breeders, nor usually so good sucklers as others that mature less early, and not so predisposed to excessive fatness while young.

Experience with the Suffolks has convinced many that wind, sun, and mud, make sad work for their tender, papery skins, and we have seen them, when reasonably well kept, become chapped and cracked all over, and the smaller pigs so mangy and sore as to present the appearance of a solid scab. Of course, all Suffolks are not so affected, and we think that in many localities, they are no more liable to suffer in this way than any other white breed. The climate of some Western and Southern States is unmistakably severe on white hogs, not well haired, and when

such are constantly exposed to biting frosts, drying winds, and scorching sun, the results will, in most cases, be anything but satisfactory, and the balance will be found on the wrong side of the ledger.

As now bred, we can not look upon them as a reasonably profitable hog for general use, but Suffolk boars can be used to good advantage on many farms where white hogs are preferred, and more refinement is desired."

Further Description. Mr. Wentworth, in a communication to the "Prairie Farmer," says.

"I read, with great interest, the report of the committee at the late



PRIZE ENGLISH MIDDLE-WHITE PIGS.

Swine Breeder' Association upon the characteristics of the Suffolk hogs. I have had them exclusively for the past eighteen years, and my sales will average one hundred every year for the past ten years, and I think I have had all the importations represented in my herd.

There is a liability in all Suffolks to have round bluish spots upon their skins, although covered with white bristles, and these spots seem to increase with age. My present boar was selected for me by Mr. Harrison, Secretary of the New York State Agricultural Society. When he arrived, aged about six months, he was spotless, and so continued until about two years of age, and then bluish spots of the size of an old-fashioned silver dollar commenced growing upon him. Now, at four years of age, he has about twenty of them, although the bristles cov-

ering them are white. Of course, these spots are exceptions, not one in ten having them, and very few inside of one year old; yet there is a tendency to them and no hog should be rejected as a pure Suffolk on their account. These spots are easily detected from black spots.

At one of the State Fairs at Chicago, one of my boars not only took the first premium as the best Suffolk, but the sweepstake prize as the best boar or any age or breed upon the ground. He had several of these spots upon him at that time, although having none until he was a year old. I notice these bluish spots occasionally upon hogs at the stock yards, which have, in all respects, characteristics of the Suffolks.

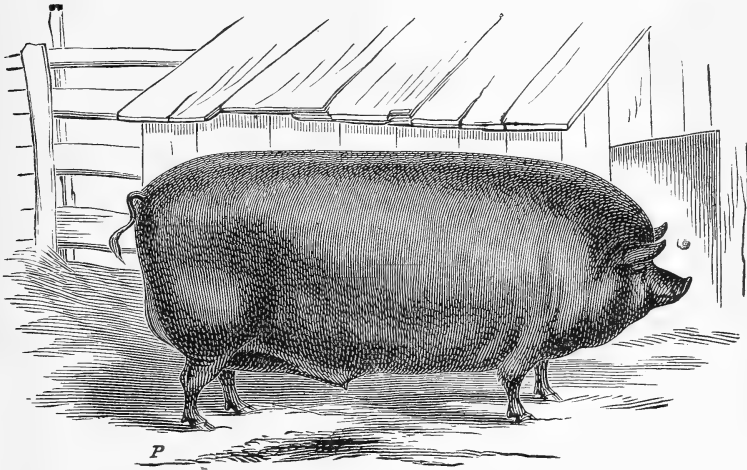
A correspondent of yours, whilst finding fault with the size of the Suffolk, thinks they are the best for crossing upon other hogs. I know this to be the invariable opinion of men who want a breed of hogs of their own, independent of everybody else. Wherever they start, whatever may be their groundwork, before they get through making their new breed of hogs they invariably incorporate somewhere a cross of the Suffolk.

Your paper says that four hundred is the profitable size of the hog. The Suffolks can easily be made to weigh this amount, by feeding them lightly until their legs have acquired sufficient strength to support their weight of carcass. The inferior weight attributed so often to Suffolks arises entirely from overfeeding them when young."

Characteristics. The characteristics and markings are as follows: "Head small, very short; cheeks prominent and full; face dished; snout small and very short; jowl fine; ears short, small, thin, upright, soft, and silky; neck very short and thick, the head appearing almost as if set on front of shoulders; no arching of crest; chest wide and deep—elbows standing out; brisket wide but not deep; shoulders thick, rather upright, rounding outwards from top to elbow; crops wide and full; sides and flanks, long ribs, well arched out from back, good length between; shoulders and hams, flanks well filled out, and coming well down at ham; back broad, level, and straight from crest to tail, no falling off or down at tail; hams wide and full, well rounded out, twist very wide and full all the way down; legs small and very short, standing wide apart, in sows just keeping belly from the ground; bone fine; feet small, hoofs rather spreading; tail small, long, and tapering; skin thin, of a pinkish shade, free from color; hair fine and silky, not too thick; color of hair pale yellowish white, perfectly free from any spots or other color; size small and medium."

Essex. Coburn on swine has the following to say regarding this breed: "The Essex breed of swine is comparatively unknown among the farmers of the Mississippi Valley, and we have no knowledge of their being raised in any considerable numbers for pork. Still in some localities, they are bred in a limited way (more, perhaps in Kentucky, than elsewhere) and we have never encountered a person who has once tried them, who did not place a high estimate on their value as a small breed, and especially on the boars to use for crossing on sows of larger breeds.

They seem to be essentially the same as Suffolks, except in their black color, and less liability to skin diseases, which would in a



PRIZE ESSEX BOAR.

majority of cases make them the favorites over their white competitors.

We think that there is small probability of the Essex swine, as now bred, ever becoming the prevailing breed, from the fact that they are a smaller class of hogs than most farmers care to raise, or packers to buy and handle, and we deem it improbable that the next fifty or hundred years will witness the raising of smaller swine, generally, than the Berkshires, and it is more than likely that in the future, the happy medium will be an animal in size between the best modelled small-boned Berkshire and the coarser Poland-Chinas of the present time."

Characteristics. The Essex is a black hog, originating in the south of England. They are of small to medium in size, and are extensively used in England to cross on the large, coarse swine, to improve their fattening qualities.

The best specimens may be known as follows: Color black; face short and dishing; ears small, soft, and stand erect while young, but coming down somewhat as they get age; carcass long, broad, straight, and deep; ham heavy and well let down; bone fine; carcass, when fat, composed mostly of lard; hair, ordinarily rather thin. The fattening qualities being very superior.

As breeders and nurses, they are very fair, though not equal to the Berkshires. In fact, all thorough-bred animals, as they become refined, or "high bred," lessen their fecund propensities to a greater or less extent; but ordinarily, with good management, no serious difficulty need be experienced on this point with well bred Essex. It is essential, however, that the brood sows be matured, and not permitted to become too fat, which latter is often apt to be the case, with good feed and management.

Good pasture, with plenty of water, will keep them in excellent condition for breeding, throughout the whole grazing season. In fact, they often come out of a good clover field in the fall, "killing fat," without having had any other feed. They are good graziers, and have the advantage over some of the more tender-skinned white hogs, of being able to withstand, (at any age, however young,) the hottest sun of July or August, without having their backs or skin in the least affected, and they are never known to scald or mange.

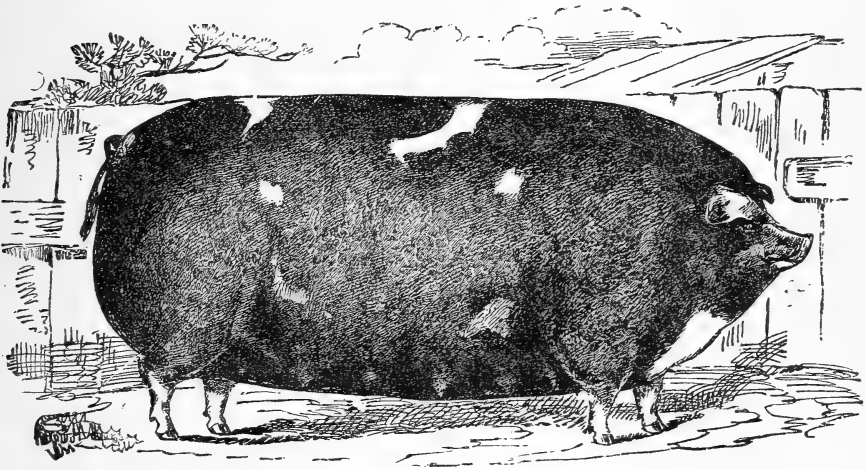
The young pigs of the Essex are usually more delicate than those of the coarser breeds, and will appear quite inferior to the latter, at the same age, up to eight or ten weeks, when they will begin to shoot ahead, and "show their breeding." This is not always the case, but often is, and is attributed to the mothers not being such good mikers as some other kinds. It seems to be their nature to run to fat rather than milk.

Poland China. The history of this well-known breed was presented at the National Swine Breeders' Convention, and the following was adopted as authentic:

"In the early history of swine-breeding in the Miami Valley, in Ohio, it is clear, from the best written authorities available, and from oral testimony, that there were two breeds, which to a great extent had been

profitably crossed with the common bristled breed of the country. These were the Russia and Byfield breeds. The Bedford breed is also named in connection with the other two. To what extent it was used, can not now be readily determined.

In 1816, we have positive proof from an unquestioned source, that the Shakers of Union Village, situated in Warren county, Ohio, and being four miles from Monroe, in Butler county, purchased at Philadelphia one boar and three sows of what was at the time believed to be pure China. They were represented to be either imported or the immediate descendants of imported stock. They were called 'Big China hogs.' These animals were the first China hogs ever brought into south-



POLAND-CHINA.

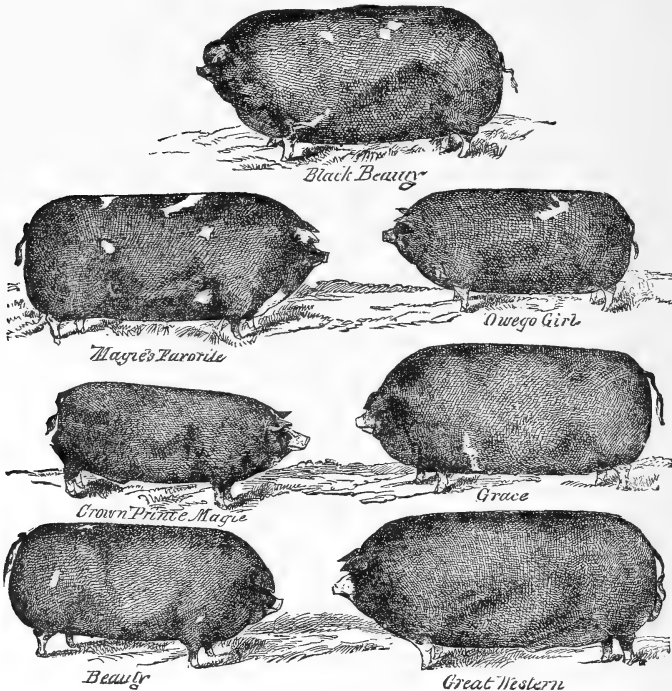
western Ohio. Subsequently other China hogs were introduced and extensively used.

The Shakers and other judicious breeders in Warren and Butler counties, continued to use the breeds at command, and produced by repeated crosses a hog of exceeding fine qualities, for that period, which was generally known as the 'Warren County Hog.' These hogs continually increasing in good qualities, were bred in both counties, and the very best specimens were carefully and interchangeably used so as to make the best crosses.

Such was the progress that had been made in forming the groundwork

of a good specimen of a hog. This condition of the breed continued until about the year 1835 or 1836, when Mr. Munson Beach, of Warren county, first introduced the Berkshire, which was obtained from C. N. Bement, of the state of New York; other lots of Berkshires continued to flow into the Miami Valley until about 1841.

The Berkshire blood was liberally introduced into the stock existing in, not only southwestern Ohio, but in Kentucky also. Crossing with



A PRIZE LITTER.

the Berkshires was almost exclusively done until about 1838 or 1839, when Mr. Wm. Neff, of Cincinnati, imported some choice specimens of the Irish Grazier. This breed soon grew into high favor, and as a consequence, was liberally used in making crosses with the best specimens of the crosses previously made. This intermingling of blood, this crossing of breeds continued for some time. In a few years, however, the use of the purer blooded Berkshire was entirely discontinued, and there

were no further importations made of the Irish Grazier. The breeders of swine in the Miami Valley settled down to the conviction that the basis of a good breed of hogs had been established, and that in the future judicious and discriminating breeders could use, and if necessary modify, the material furnished, so as to meet the highest demands of public. For more than thirty years no new blood has been introduced into our breed, and no effort made to obtain a new supply of the blood of either breed previously used.

While this is true, our breeders have not been indifferent to the further improvement of our breed. Stimulated by their success, they have perseveringly aimed to improve what they have been so successful in forming. The best points or qualities have been preserved, and, where practicable, have been made even more excellent. All defective points or undesirable qualities have been corrected or improved by the care, skill, and judgment of our experienced breeders.

Thus, we have a breed thoroughly established, or fixed characteristics, of fine style, and unquestioned good qualities, which can be relied upon for the production of a progeny of like qualities and character.

Characteristics. The best specimens have good length, short legs, broad, straight backs, deep sides, flanking well down on the leg, very broad, full square hams and shoulders, drooping ears, short heads, wide between the eyes, of spotted or dark color; are hardy, vigorous, and prolific, and when fat are perfect models all over, pre-eminently combining the excellences of both large and small breeds."

Victorias. The family of pigs known as Victorias originated with Col. Frank D. Curtis, Kirby Homestead, Charlton, Saratoga county, New York. They were made by crossing the Byfield hogs with the native, in which there was a strain of the Grazier. Subsequently crosses were made with the Yorkshire and Suffolk; the result being a purely white hog, of medium size. The name has no significance, unless it is intended as a compliment to the English Queen. The pigs if pure bred, should have a direct descent from a sow called Queen Victoria, which may be said to be the mother of the family. She was pronounced by good judges, to be almost perfect, and was the winner of a number of first prizes. Breeders in the Eastern states have long felt the want of a medium-sized white hog, with all the good points of the English breeds, without their objectionable features; a breed which would mature early, and be covered with a good coat of hair to protect it from the cold in winter and heat in summer. Col. Curtis began breeding nearly twenty

years ago to try and meet this want. At the fair of the New York State Agricultural Society which was held at Elmira, he exhibited a sow, Princess Alice, and six pigs, which was the first time the Victorias have been presented at a State fair for competition with other swine. The first prize was awarded to the pigs, and the second to the sow.

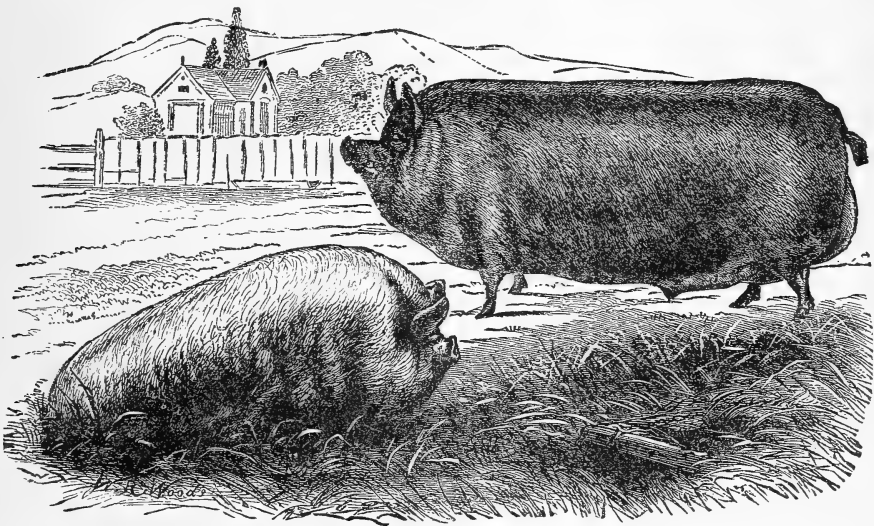
Characteristics. The color is white, with a good coat of fine soft hair; the head thin, fine, and closely set on the shoulders; the face slightly dishing; the snout short; the ears erect, small, and very light or thin; the shoulders bulging and deep; legs short and fine; the back broad, straight, and level, and the body long; the hams round and swelling, and high at the base of the tail, with plaits or folds between the thighs; the tail fine, and free from wrinkles or rolls; feathers or rosettes on the back are common; the skin is thin, soft, and elastic; the flesh fine-grained and firm, with small bone and thick side-pork. The pigs easily keep in condition, and can be made ready for slaughter at any age.

Durocs. There is another family of heavy hogs called Duroc, which are bred in Saratoga county, New York, which are finer in the bone and carcass than the Reds. They have been bred, with their crosses, in that region of the country, for about twenty years. They are very hardy, and grow to a large size.

Characteristics. The true Duroc or Jersey Red should be long, quite deep-bodied, not round, but broad on the back, and holding the width well out to the hips and hams. The head should be small, compared with the body, with the cheek broad and full, with considerable breadth between the eyes. The neck should be short and thick, and the face slightly curved, with the nose rather longer than in the English breeds; the ears rather large and lopped over the eyes and not erect. Bone not fine, nor yet coarse, but medium. The legs medium in size and length, but set well under the body and well apart, and not cup up high in the flank or above the knee. The hams should be broad and full well down to the hock. There should be a good coat of hair of medium fineness, inclining to bristles at the top of the shoulders; the tail being hairy and not small; the hair usually straight, but in some cases a little wavy. The color should be red, varying from dark, glossy, cherry red, and even brownish hair, to light yellowish red, with occasionally a small fleck of black on the belly and legs. The darker shades of red are preferred by most breeders, and this type of color is the most desirable. In disposition they are remarkably mild and gentle. When full grown

they should dress four hundred to five hundred pounds, and pigs at nine months old should dress from two hundred fifty to three hundred pounds.

Cheshire, or Jefferson County Swine. These hogs originated in Jefferson county, New York, and it is claimed by some of the breeders that they started from a pair of pigs bought of Mr. Woodford, of Albany, New York, which were called Cheshires. However that may be, there is no such distinct breed of hogs known as Cheshires, in England, and there is no record of any hogs of this name having been imported into this country.



Pride of Oxford.

PRIZE PIG.

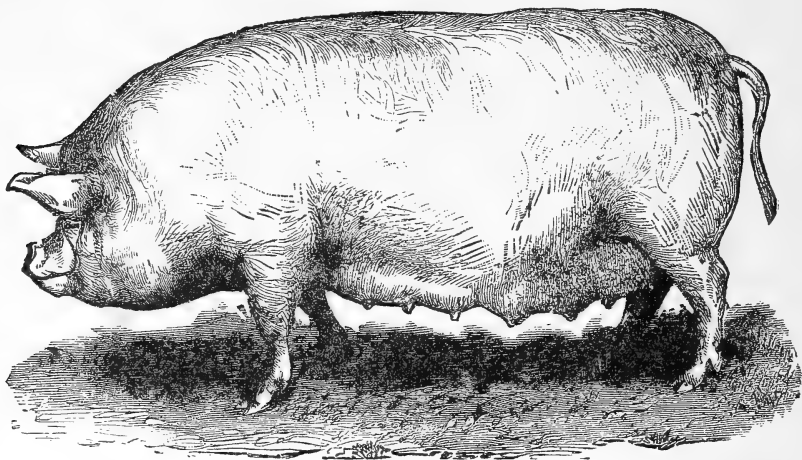
Barnum 2nd.

ENGLISH SMALL WHITE PRIZE PIGS, USUALLY CALLED THE SMALL YORKSHIRES.

Yorkshires have been imported into Jefferson county from time to time, and the so-called Cheshires have been improved by crossing with their best hogs bought in Canada. Mr. A. C. Clark, of Henderson, was, for a number of years, a prominent breeder of these pigs, and whenever he found a pig better than those he owned, he purchased it and crossed it upon his own stock. In this way this family of hogs have been produced, and they are known and bred in many portions of the United States.

They are pure white, with a very thin skin of pink color, with little hair; are not uniform in this respect, as pigs in the same litter differ widely in the amount of hair; the snout is often long, but very slender and fine; the jowls are plump and the ears erect, the shoulders are wide, and the hams full; the flesh of these hogs is fine-grained, and they are commended on account of the extra amount of mess pork in proportion to offal; the tails of the pigs frequently drop off when young.

Jersey Reds. The positive origin of this family of swine is unknown. They have been bred in portions of the state of New Jersey, for upwards of fifty years, and with many farmers are considered to be a valuable variety. They are of large size and capable of making a heavy growth, five hundred and six hundred pounds weight being common.



THE "LARGE WHITE" BREED SOW, HOLYWELL QUEEN.

Mr. David Pettit, of Salem county, N. J., has known of these hogs for thirty years, and Mr. D. M. Brown, of Windsor, for nearly fifty years. They are now extensively bred in the middle and southern portions of New Jersey. In some neighborhoods they are bred quite uniform, being of a dark-red color, while in other sections they are more sandy, and often patched with white. They are probably descendents from the old importations of Berkshires, as there is no record of the Tamworth, the red hogs of England, ever having been brought into this country; nor is this likely, as the Tamworth were not considered a valuable breed, and

were confined to a limited breeding. The Reds resemble the old Berkshires in many respects, but are now much coarser than the improved swine of the breed.

Characteristics. A good specimen of Jersey Red should be red in color, with a snout of moderate length, large lop-ears; small head in proportion to the size and length of the body; they should be long in the body, standing high and rangy on thin legs, bone coarse; heavy tail and brush; hair coarse, including the bristles on the back. They are valuable on account of their size and strong constitution and capacity for growth. They are not subject to mange.

Chester Whites. "The Chester County White hog is a native of Chester county, Pennsylvania, where the breed originated. The first impulse to the improvement of swine in this country was induced by the introduction of a pair of very fine white pigs, brought from Bedfordshire, England, by Captain James Jeffries, of this county, and put upon his farm on the Brandywine Creek, near Westchester, the county seat in the year 1818. Some of our most enterprising farmers, seeing these finely-bred pigs, were induced to commence an improvement of their swine by a cross of these, their progeny, and others of the best hogs of the county, and by continuing a careful selection and judicious crossing for many years, have produced the Chester White of to-day, a most desirable, well-formed, good-sized, easily fattened, and perhaps the best bacon hog for the general farmer in this or any other country."—Thomas Wood, in Swine Husbandry.

Characteristics. Head short, broad between the eyes; ears thin, projecting forward and lap at the point; neck short and thick; jowl large; body lengthy and deep, broad on back; hams full and deep; legs short, and well set under for bearing the weight; coating thinnish white, straight, and if a little wavy not objectionable; small tail, and no bristles.

Yorkshires. "Their color and characteristics have been traced, in a greater or less degree, into every popular breed of swine which has been made up or attempted to be established as thorough-bred, either in the United States or England; indeed, into every breed, save the Essex, or Neapolitan, imported by Lord Western. These are the only pure bred black hogs either in this country or the old. It may safely be said of these white hogs, that they are the only pure and distinct breed of hogs or pigs, save the black, that are now bred on this continent. All breeds in this country of mixed colors are what their color indicates—

mixed or cross bred, hence not pure and distinct breeds. That this is correct, is fully established by the history of each popular breed, as given by the breeders themselves, as well as by Youatt, Harris, and others, who have given detailed accounts of how each valuable breed has been formed. Nearly or quite all of these breeds are indebted for many of their valuable qualities to their crosses with the Yorkskire and other white English and China hogs. And among the breeds so indebted are the Chester White, the Berkshire, and the Magie, or Poland-China. All these breeds seem to have borrowed some of their good qualities from these original white hogs, and all are made up from crosses of the white and black hog; hence the character of the English or white hog crops out occasionally in almost every breed known in this country or England. Accordingly, it may be said that they are the purest breed of hogs, and the best in this country or England from which to make crosses in forming a new or reliable breed.

The English white hogs, like other breeds, vary much in size, from the large hog to the China pig, so that the breeder can change the size of his stock, or the coat it wears from a heavy coat of hair to the short and smooth, to suit his fancy or the condition of the climate in which he lives. All white hogs are noted for possessing quiet dispositions.

The Cumberland, a middle-bred Yorkshire, have, we think, attained nearer perfection than any other breed known to us. They are not generally distributed throughout the west, but when through-bred specimens have been introduced, they are held in great esteem, as well for an animal for exhibition purposes, as for family use. They are special favorites with packers, who buy their stock on foot, for the reason that they yield larger proportionate net weights than any other hogs which grow large enough for their use. They are small in bone, but large in flesh, of the very best quality, evenly and proportionally spread over the whole frame."

CURING AND PRESERVING.

"To cure meat of any kind, it is desirable to have it from animals that, before slaughter, were in a considerable degree matured, or had attained their natural growth. After dressing, as before intimated, the first requisite is temperature so low the eggs cannot hatch, the latter being not often practicable.

The season of the year, in which meats may be cured on the farm with the best success, is from December 15th to February 15th, the interval between these dates affording two indispensable conditions, viz: cool weather and immunity from insects and pests.

Pork is cut to suit the demands of the different markets in which it is sold, and the various uses for which it is intended, but the aim should, in all cases, be to have it in such form as to pack snugly, and we repeat, never pack down until thoroughly cooled throughout.

Where it is intended to use brine, the meat may be packed in layers; salt, at the rate of eight pounds to each hundred pounds of pork, is to be sprinkled evenly over and around each layer, until the cask is full; then clean rain or other pure water, is poured in, until all the interstices are filled and the meat thoroughly covered. None of the meat should, at any time, be allowed to remain above the brine, and in open casks, or tubs, some attention will be necessary to keep weights so arranged as to hold it under.

Many persons prefer to prepare the brine by adding to the salt some sugar, or molasses, and saltpeter, dissolving these in the water, and pouring the pickle over the packed meat. A very good recipe is as follows: for one hundred pounds of pork take four ounces saltpeter, three pints common molasses, or two pounds brown sugar, and seven pounds clean salt; when thoroughly dissolved, pour over the meat, which it will cover if properly packed. Many boil the pickle before using it, as the impurities from the salt, sugar, etc., will rise, and can be skimmed off; when this is done, the brine should be thoroughly cool, before adding it to the meat.

Hams and shoulders, to keep well afterwards should be in pickle from one to two months; the length of time depending on their thickness. For curing them without brine, a favorite recipe is: twelve pounds fine salt, two quarts molasses, one-half pound powdered saltpeter; when these are well mixed, they will have about the consistency and appearance of damp brown sugar, and will be sufficient for one hundred and fifty pounds of meat. Rub hams and shoulders thoroughly with the mixture, and lay singly on a platform in a cool, dry place. At the end of the first, and of the second week, rub them again as at first, and then expose to continuous smoke for ten days.

A simpler way, in which any portion, or all, of the hog's carcass can be cured, is to put a layer of, say, half an inch of salt on a platform, floor, or the bottom of a large box, or cask, then a layer of meat, on this

a liberal sprinkling of salt, and so on, until all is packed and the top well covered with salt.

Such portions as are not to be smoked, should be stored in brine before insects appear, and the smoked meat may, like the hams of commerce, be covered securely with canvass, and whitewashed, or packed well in bran, dry ashes, oats, or shelled corn. For considerable quantities, packing in tight barrels is a good plan, and for family use, a swinging shelf, with sides and ends covered with wire cloth, inside of which the pieces are hung, is convenient, and is also secure against rats and mice, as well as insects."—Coburn in *Swine Husbandry*.

SOWS EATING THEIR PIGS.

It is well known that sows not unfrequently attack and destroy their young; or, if prevented in this will not let down their milk, so that the young pigs necessarily die for want of nourishment. When this condition of things is not caused by a diseased condition of the uterus, it is said that the sow can be brought to terms by pouring a mixture of ten to twenty grains of spirits of camphor, with one to three grains of tincture of opium, into the ear. The sow will immediately lie down on the side to which the application was made, and remain quiet in this position for several hours, without interfering with her pigs; and on recovery from her stupor, will have lost her irritability in regard to them. The experiment has been tried in Germany hundreds of times, according to one of the agricultural journals, without any injurious effects. It is also said that the eating of pigs by the parent sow can be readily prevented by rubbing them all over with brandy, and making the same application about the nose of the sow herself, or saturate a small woolen cloth with kerosene and carefully moisten the hair of the pigs with it, but be cautious to not get much of it on their tender skins. Usually the kerosene dressing will spoil the sow's relish for raw pig.

DISEASES AND HOW TO CURE THEM.

Mange. Mange, itch, or scab, in the lower animals is a skin disease of a purely local nature, due to an insect which induces irritation, ulceration, suppuration, and incrustation on the surface of the body generally. It is a contagious disease, never originating spontaneously,

and requiring for its development the passage of the parasites or their eggs from diseased to healthy animals. In men, this disease is termed "the itch," and in the lower animals it is usually alluded to as "mange" and in sheep it is well known as a fearfully destructive disease, under the name of "scab."

The mange of the pig is due to the presence of a burrowing sarcoptes. *Sarcoptes suis* is much like the human sarcoptes and the horse sarcoptes. Itch and mange are known to be essentially skin diseases, curable alone by topical remedies; and the medicines used are valuable almost in proportion to the rapidity with which they destroy the life of the parasites which give rise to the irritation and other morbid appearances.

In treating the mange we should first cover the body with soft soap, and wash it off some time afterwards with warm water, and have the animal well brushed; or a wash may be used, consisting of one part caustic potash to fifty parts of water; or one part of creosote to forty parts of oil, well mixed; or sulphuret of potassium in water, in the proportion of one to ten parts; or a decoction of tobacco, in the ratio of one to twenty-five; or lastly, concentrated vinegar. One or two days after the thorough application of either one of these preparations, wash the body well with soap and water or potash lye. When scabies is treated, it is essential to purify all objects with which animals can come in contact. Thus, all rubbing-places and sties should have a covering of lime, or chloride of lime. The sties should be cleaned out entirely, or the pigs removed for a few months to a new pen.

Recipe For Mange Ointment. Melt half a pound of common turpentine with a pound and a half of Lard. Stir well therein a pound of flowers of sulphur, and when cool, rub down upon a marble slab, two ounces of strong mercurial ointment with these.

Pigs Losing Their Tails. Pigs occasionally have their tails frozen, which causes them to drop off, or may result from an hereditary tendency to a disease of the skin which attacks the young pig at that particular point, the circulation is interfered with, and the member perishes and drops off.

If the disease appears, apply carbolic soap to the affected part, or wash clean, and apply glycerine, sweet oil, or a little fresh lard.

The most effectual preventive is to keep pigs clean, dry, and abundantly nourished.

Inflammation of the Brain, or "Blind Staggers. This disease frequently attacks swine, especially when changed to rich, abun-

dant food, or exposed to stormy, changeable weather. At first the animal appears dull, stupid, and disinclined to move. The eyes become red and inflamed, the bowels constipated, the pulse hard and quick. In a short time, if not relieved, the animal runs wildly about, usually in a circle, seems blind, will run against objects, the breathing becomes rapid and laborious.

When a hog is attacked, dash bucketsful of cold water over the body, and throw into the rectum a purgative injection, composed of six ounces of sulphate of soda and one or two tea-spoonsfuls of spirits of turpentine in ten ounces of water. Setons saturated with the turpentine may be inserted under the skin behind the ears; or the back of the neck may be blistered by actively rubbing in the following mixture. Spirits of turpentine and liquid ammonia, one ounce of each; powdered cantharides, two drams. When it occurs in summer, or hot weather, its severity can be greatly modified by providing shelter in a shed, where they can be in the shade during the heat of the day; but at the same time a free circulation of air should be secured. Water, too, should be constantly within the reach of the animals, and, if possible, a pool of it provided in which they can lie at will.

Diarrhea. Many of our swine breeders in the West sustain considerable loss annually by their pigs dying from the effects of what is commonly called scours, caused by the bad quality of the sow's milk. The disease is more apt to make its appearance when the sow has been fed upon dry corn or musty food. It generally attacks them within one or two days after their birth, and seldom after eight or ten days. To cure give the sow as much sulphur of the third decimal trituration as will stand on a nickel five-cent piece, once a day. It may be given in a little sweet milk, or upon a small piece of bread, and should be given one hour before feeding. The medicine can be procured of any Homœopathic physician. Common sulphur will cure, but the above is preferable.

Constipation. If swine void hard, dry dung in compact, ball-like masses, it denotes fever, therefore change to more loosening, cooling diet. Any kind of soft, easily digested food is good; bran mash prepared with hot water, or flax-seed tea.

In obstinate cases, an ounce of Epsom salts may be given, in an injection of warm soap suds.

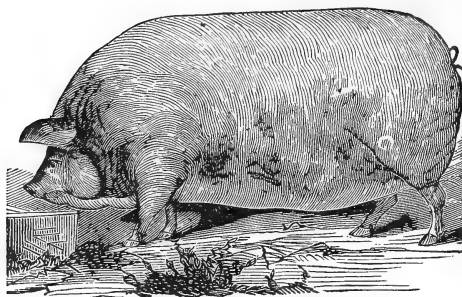
Lice. The following remedy will clean off lice by a couple of applications. Put about one gill of kerosene in an old dish, and with a paint brush or old woolen rag rub the oil up and down the back of the animal,

and behind the fore-leg, and on the flank. Be particular about the last two places, for it is where the lice deposit their eggs, which, if not destroyed will hatch out in five days. If it be a black hog, these eggs can be plainly seen, being about the size of a timothy seed, and laying close to the skin fast to the hair. No one need fear to use the oil freely, as it will not injure the hog in the least.

So-Called "Hog Cholera." This disease is properly called Anthrax Fever, and develops the following symptoms: The animals suddenly appear dull, separating themselves from the herd; and totally refusing food and water, they seek dark places, or dig themselves beneath the litter, or into the ground. Symptoms of colic and a disposition to rest on the belly are amongst the signs indicating abdominal pain. Diarrhea soon sets in; also occasionally violent retching and vomiting. The animal is not able to move freely on account of weakness in the hind quarters; it staggers, and at last, paralyzed it cannot move. Deglutition is interfered with, and the breathing is difficult. Painful swellings occur around the throat, extending downwards to the chest, which swelling is hard, hot, and painful. There is also frothing at the mouth and a painful cough, and appearance of boils. Sometime before death a discoloration of the skin appears on the neck, the ears, the back, under the belly, or the inside of the hind extremities, which discoloration, from being at the beginning of a bright-red or purple color, at the last stages of the disease attains a dark-bluish or black color. The visible membranes of the mouth and nose attain a dark livid color, and the mucous membranes of the eyelids and the white front of the eye become dark-red. Death occurs often very suddenly, and in most cases within twelve hours to two or three days. Recovery is seldom, and generally very slow, if ever complete.

The treatment is most unsatisfactory, owing to the acute nature of the disease; in fact, all remedies are useless when not administered as soon as the first symptoms appears. When the disease breaks out in a herd, the animal should be kept on low diet, have plenty of exercise and fresh air. In the early stages of the disease cold water sluicings, often repeated, have proved beneficial, and, so has the method of burying in the earth in a cool and dark place. For this purpose a hole is dug, sufficiently large and deep to admit Mr. Pork sidewise, (the legs being previously tied with a soft straw band); the body is then covered with a sufficient quantity of earth and grass turf, leaving the head free; and in order to support the head, a grass turf is laid under the snout. Before

burial, several injections, consisting of cold water with vinegar, are thrown into the rectum. In order to keep the surrounding earth constantly cool, cold water is, every half hour, to be let on it. The animal remains thus buried until it recovers, which, in successful cases, happens within six, twelve, or eighteen hours. Hog cholera is treated in many different ways, each having its advocates; some people have seen the good effects of bleeding in the early stages of this disease. Emetics and purgatives, in connection with lukewarm injections of salt water with vinegar, are very strongly recommended. In the beginning of the disease, success has always attended the administration of an emetic, such as white hellebore and ipecac, of each two parts; tartar emetic, one part; mix and give a small pig a scruple, and a larger one half a dram, thrown dry upon the root of the tongue; this is to be followed up by purgatives and clysters. Purgative to consist of Epsom salts, one to three ounces, according to the size and age of the animal, administered in broth or swill from a bottle. Exercise, fresh air, and sluicing the animal over with cold water are measures to be recommended. Animals that recover, unless well treated, continue to suffer from partial paralysis, or from rheumatic inflammation of the joints.



SWINE BREEDING AND FEEDING.

‘‘It is a true saying ‘that farm stock will be just what its owner makes it.’ It is true of swine to a greater extent perhaps than any other animal on the farm. They can exist under adverse conditions and live with less care than any other stock, except, perhaps, the hen. On the other hand they will more readily respond to good care and feed than any animal we raise on the farm. They can eat anything from dish water to grass and grow upon it, if given something else to fill up the ration.

Therefore, by this quality mentioned, he becomes a very valuable animal to the farmer and farm. There has been but little attention paid by the average farmer to the breeding of swine, and less care given to the selection of breeding stock, than any other branch of live stock. Sometimes an enterprising farmer would break away from the custom of keeping runts for breeding stock and buy a thoroughbred male and use it on ordinary sows; but, also, the male from this cross was used by him and his neighbors instead of buying another thoroughbred and using it on the females of the first cross. But many did not even go as far as this; but were content to keep on breeding the same old razor back, with long legs, narrow chests, thin hams and an ugly disposition—pigs that looked large but weighed light. Now in the breeding of all animals we must have some end in view, so too with the swine. As I am speaking of the breeding of swine for profit, we have first to consider what the market affords. In most markets the demand seems to be for a pig that will weigh when dressed from one hundred to one hundred twenty-five pounds with as much lean meat as we can get. With some packers a one hundred fifty pound pig is more desirable. But heavy hogs seem to be slow sale, and the time when tons of lard would be sold as pork for a big price has passed away. Therefore, in the selection of breeding stock, we should try to get what will weigh from one hundred to one hundred twenty-five pounds, dressed, in the shortest time with the least amount of food. This is not an easy matter, but by a careful and judicious selection governed by an unprejudiced study and trial of the different breeds will enable one to come very close to getting the pig which will accomplish this. There are several other things in the breeding of swine that should not be neglected. As a pilot in steering his boat to the harbor must avoid all breakers, shallows and reefs, so too must the swine breeder, in his effort to get the pig he wants, see that he discards the

pig with no constitution or one that is unprolific. How many breeders in the effort to shorten the snout of their swine have ruined their strength and vigor? Many more in their haste to broaden the back have very materially shortened the heart girth, and in their effort to make their legs small have made them weak and crooked. Poland-China breeders of the west have a nice-looking, growthy pig; but, as a breeder of them in central New York told me, his litters were from four to seven, and small litters is the complaint of the west. There is also among them a tendency to weak legs. Berkshires have been bred for fineness of bone until they became too small, although in the last few years there has been a great improvement in them. The Chester-Whites have been bred for size until they are made up of masses of fat, to which the butchers object. The Cheshires are a prolific and active breed, but are rather too restless and, also, quite narrow on the back. The Duroc-Jerseys are not as smoothly made as the Berkshire or Poland China, but in prolificness and quickness of growth will exceed either of them. Either of these, that is the Duroc-Jersey, Berkshires or Poland-Chinas, I would recommend to the farmer to use on ordinary sows, choosing the one which will suit his fancy best. In choosing a male from these breeds select one that has a snout of medium length, a slight dished face, good size heart girth (be careful that there is not much depression back of the shoulders), good length and breadth of back, a good wide space between the front legs with a deep body and good square hams; also have the flank well down and a set of short, stout and straight legs. The skin should not be thick and wrinkly, but thin and smooth with soft bristles not too thickly set. This kind of a pig can be found better at some reliable breeders, as he and others before him, have been working for years to get this type of a pig, and are, therefore, better prepared to furnish the desired article. But by all means use a thoroughbred sire and on his offspring use another one, thereby raising the quality of your breeding stock. Be sure to start right in this direction so that your feed and care in the future will produce the best results.

Having selected your breeding stock, the next thing is the keeping of them. There has been a mistaken idea that breeding swine to do well must be fed only enough to keep them just alive. Now, we know all other breeding stock should be kept in good condition, and swine form no exception. When mated, both the sire and the dam should be in the pink of condition to produce strong and healthy pigs, and during the period of gestation the dam should be well fed on a variety of foods so

that she may store up food to feed the coming generation. Then, if she is allowed a chance to exercise and good, dry quarters to nest in, barring accidents, she will bring forth a good litter of strong pigs. As the time of farrowing draws near she should be separated from others and given a litter of short rye or wheat straw. Let her be kept as quiet as possible, and if she has been rightly handled she will be gentle and allow any attention that is necessary. Give her sparingly of food for a few days and increase her ration as you think the demands of her sucklers require. Have the trough long enough so that the pigs can learn to eat. When the pigs are four or five weeks old have, if possible, a pen where they alone have access, and then give them what feed they will eat. At two months of age wean them, and if the sow is kept for breeding, let her again mate, which she will do within a week. Now, when the pigs are weaned is the time to be careful. They should be fed at least five times a day on a well-balanced ration, and not much at once, or their stomachs will become distended and indigestion (which will stunt them) will be apt to follow. They should have a nice pasture or orchard to run in, as grass and apples will keep them growing and healthy.

A hog's stomach being very nearly like a man's; in fact, an old maid once said to her class in physiology 'the internal organs of a hog are the nearest like a human being of any dumb brute, unless it be a man.' That is the reason they do not agree any better, perhaps. For a single food, give skimmed milk; next, wheat middlings. The best pigs can be raised by feeding on wheat bran, corn meal, oil meal and skimmed milk, with a run in pasture and orchard. But the most profit comes to him who feeds the by-products of the farm in connection with a grain ration. Small potatoes, windfall apples, even pumpkins will help put flesh on the pigs. Do not feed much whole grain to a pig, as his teeth soon get sore and it passes the stomach without being digested. But give him just enough to clean his teeth after his soft feed. Never throw his feed in the dirt, for although a hog needs fresh dirt, yet let them take it separate. Be careful not to overfeed, as it will derange the stomach and the pig becomes restless, rooting and eating stones, and there will be a loss of feed as well as a loss of gain in the weight of the pig. Always make it a rule to have the pig look for more without squealing for it. This only can be done by watching them eat occasionally. To feed a pig all he will eat at any great length of time is always attended with a loss. The ocean steamer to cross the Atlantic a day quicker than the usual time will consume twice the amount of coal besides the extra wear on

her machinery caused by the high rate of speed. So it is with the high-fed pig, besides the loss of feed there is the extra amount of fat, which is undesirable.

Remember, no butcher wants a pig over one hundred fifty pounds, but would rather have them at one hundred pounds. It also costs less to make a pig of that size than one heavier. Experiments show that one hundred pounds of growth can be made, on a pig weighing fifty pounds to start with, by feeding two hundred seventy-three pounds of feed, while it requires four hundred seventy-nine pounds of the same kind of food to make a like gain on a pig that weighs one hundred fifty pounds, and it requires five hundred seventy-one pounds of food to make a one hundred pounds gain on a two hundred fifty pound pig, showing that it costs double to make a pound of pork on a two hundred fifty pound pig that it does on a fifty pound one. So the man who feeds heavy pigs produces what the market does not want at a greater cost than he who feeds light ones.

Now, a few words as to the care of swine. Swine are natives of a tropical climate, and are, therefore, sensitive to cold and dampness. Then give them dry, warm quarters with not too much litter. Do not, for the sake of your pocket, allow them to shiver and squeal all through the storms and cold of winter. And last, but not least, do not kick and club them when you wish to drive them, or when driven by hunger they seek to satisfy their wants in forbidden places. But with kindness he will go where you wish him to, and with proper feed and fence will stay where you put him. No domestic animal will respond to kind treatment and good feed quicker than the pig, and no animal will make a pound of flesh with as small a cost as a pig. There is no branch of farming which has brought as much clean profit as pork making; to him who has kept his pigs in clover doubly so. That is, the man who has studied intelligently to supply the wants of his swine."

LLEWELLYN LENT.

POULTRY DEPARTMENT.

How to Make Poultry Keeping Profitable.

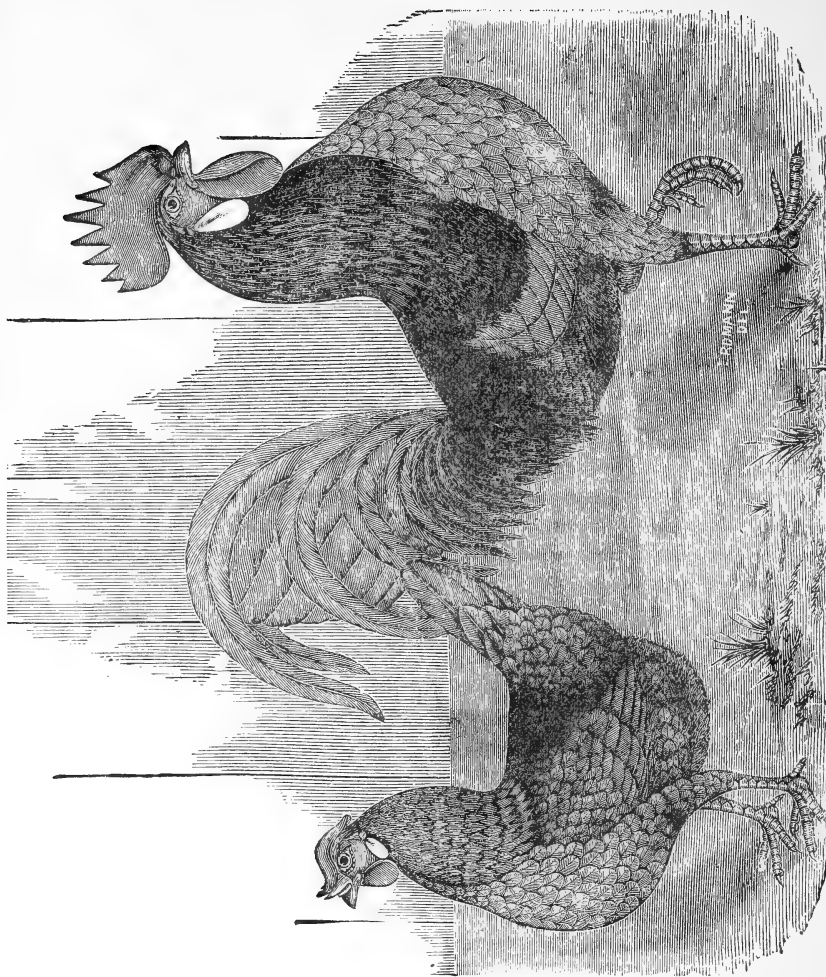
A CONCISE DESCRIPTION OF THE VARIOUS BREEDS
WITH THEIR SPECIAL ADVANTAGES AND
DISADVANTAGES.

POULTRY is raised to a greater or less extent on every farm, and whether they are kept for special profit or only for family use, they should be cared for and thoroughly managed, as well as other departments of the farm, so that whether few or many, a profit may result from the investment of time and money.

The farmer has the advantage of plenty of room for his poultry, food for them at first cost, and in return, by grafting this upon his other work without any great extra expense, receives, if he does not care to sell in the market, plenty of eggs for family use, choice young poultry for his table, and a compost to enrich his soil.

If the poultry is raised for profit the farmer has the means of getting his produce to market at once, and can contract with hotels and private families, who want only good "fresh-laid eggs." But this business, like every other kind, to be really successful, requires thought, attention, care, and intelligence, and when these are exercised under proper conditions, there is sure to be "money in it."

Nature's laws are to be respected if success is to follow. Fowls, when wild, live entirely in the open air, having perfect freedom, and the farmer with his land may approach this condition as far as it is necessary.



ANDALUSIAN FOWLS.

Description. We here give a short description of the various breeds, together with their characteristics, so that it will be easy to decide which one will be the most suitable for the place where they are to be kept.

Andalusians. This is sometimes called the Blue Spanish and is one of the leading varieties of the Spanish group. This group has been described as follows:

"A close, compact, smallish-sized body, placed upon legs of a good length; the neck rather long, with a fine head; a large, upright-single cock, and in the hen also large, but falling over one side; and the cocks have large sickle-shaped tails. Of course the color of plumage, legs, &c., are different in the several varieties, but the general appearance is as here described.

In Andalusians the plumage is slate-colored, but on the cock's neck and back it is dark purple or nearly black. The birds are of a good size, are prolific layers of large white eggs, are precocious as chickens, very hardy, bear confinement well, are fair table birds when young, can be kept on all fairly dry soils and are non-sitters. In selecting birds attention should be paid to size, to erectness of carriage; and any white on the face, which ought to be red, should be avoided, as this indicates a cross with the black Spanish."

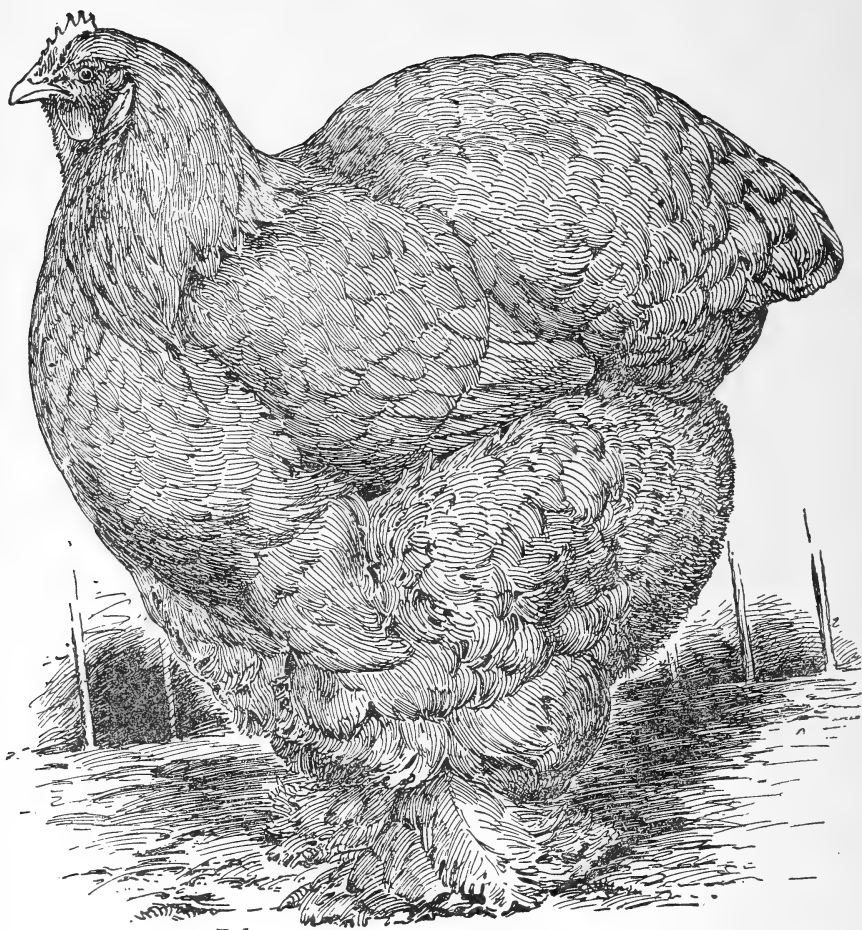
Brahmas. This breed is one of the most prominent breeds of fowls. It is chiefly valuable for its great size and hardiness, and for laying well in winter. The eggs, which are buff in color, are often small, but are rich in quality.

They are not a first-class table fowl, so far as quality of flesh is concerned, having more of the flesh laid on the legs than on the breast; but when young they are desirable, especially when size is considered.

For a family fowl they are unequalled, and a large Brahma chicken is a dinner for a fair sized family.

There are two varieties of Brahmas, the dark and the light, which are alike, save in color. The bird is of pleasing shape, well-proportioned and handsome. It has deep, massive body, neat head, small pea-comb, and heavily-feathered legs. They are good sitters and mothers, though clumsy when old; are very quiet in habits; moderate layers; and can be kept on any soil. They are so large and the wings so weak they can be kept in bounds with an ordinary fence.

Cochin. This was once the most popular breed of all. Cochins somewhat resemble the Brahmas in shape and appearance, but have more feathers and are rather rounder. As winter layers they are fairly good,



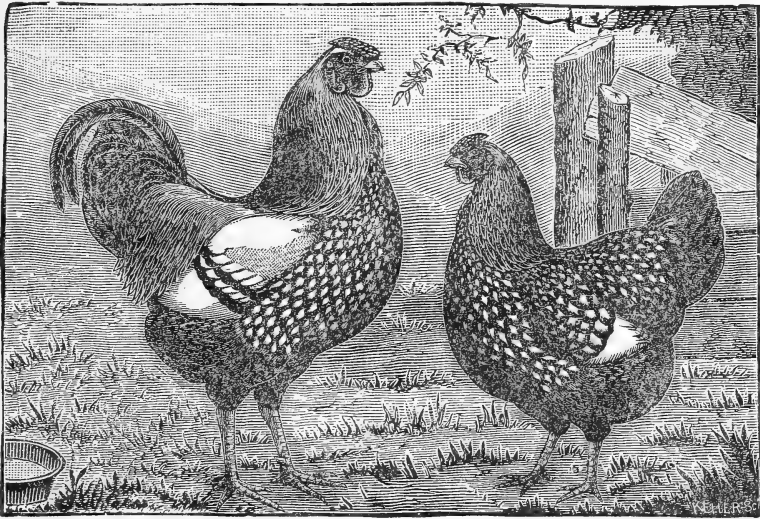
COCHIN, ENGLISH TYPE.

but in the spring they want to eternally sit, so few eggs are the result. Of all fowls the Cochins are the greatest sitters, and when a Cochin wants to sit, sit she will, even on stones or small blocks of wood, if she has no eggs. They are clumsy and often break the eggs and kill the young chicks.

The flesh is coarse and the bones are large, hence they make poor table fowls.

There are four colors, buff, black, white, and partridge, all of which look good on exhibition, in fact are handsome, and they are the fowl where appearance, and not utility is looked for.

As a commercial fowl the Cochin is very undesirable.



LACED WYANDOTTES.

Wyandottes. This is a variety of American origin, and one which has won such great favor that it has become one of the most popular, if not the most popular fowl of the present time. It carries the Sebright lacing, and this makes it a very handsome bird, when it approaches anything like perfection. The Silver Laced Wyandottes were the first of this deservedly popular variety, but the Golds and the Whites have since made their appearance. The Golds are very rich in color and are very pleasing birds. It is a large breed, with the Asiatic shape, having no feathers on the legs, and a rose comb. It combines most of the good qualities, being a good table fowl, a prolific layer, a good sitter and



BROWN LEGHORNS.

mother. The average farmer can make no mistake in introducing this admirable bird for general use.

Leghorns. This bird has a peculiar history. It is a sub-variety of the Spanish type of fowls, and being principally bred in Northern Italy, it is all over the continental part of Europe called the Italian fowl. It was brought from Italy to the United States, and then taken again across the water to be introduced into England.

This is a breed of utility, and not a breed of fancy points. Originally there were only two varieties, the white and the brown, but to these have been added the black, the cuckoo, the darkwing, and the buff.

The Leghorns have a good-sized, single, deeply-cut comb, with saw-tooth edges, which extends down well over the back of the head, and in the hen falls over on one side, in a single fold; the wattles are long and hanging; has white ear-lobes, yellow bill, red face, clean yellow legs, and in the cock a sweeping tail.

The body is small, but close and compact, and their general appearance is pleasing.

BROWN LEGHORNS, the subject of our illustration, have markings much like the brown-red game.

In the cock the hackles are golden bay, striped with black; the back is of general red color, each feather having a brighter bay stripe; the breast is a rich black; their dark red wings are of good size and striped across with bars of bay and a greenish-black; their long sickles are green and black; and their legs are yellow.

In the hen the hackles are yellow, striped with brown; the back is brown with slight pencilings; the breast is a light salmon-brown; the remainder of the female bird does not vary much in appearance from the male.

The other varieties are named from their general color or peculiarities, and are easily identified. The blacks are self-color, the cuckoos are black and white mixed, the darkwings are very similar to game, and the buffs have yellow feathers.

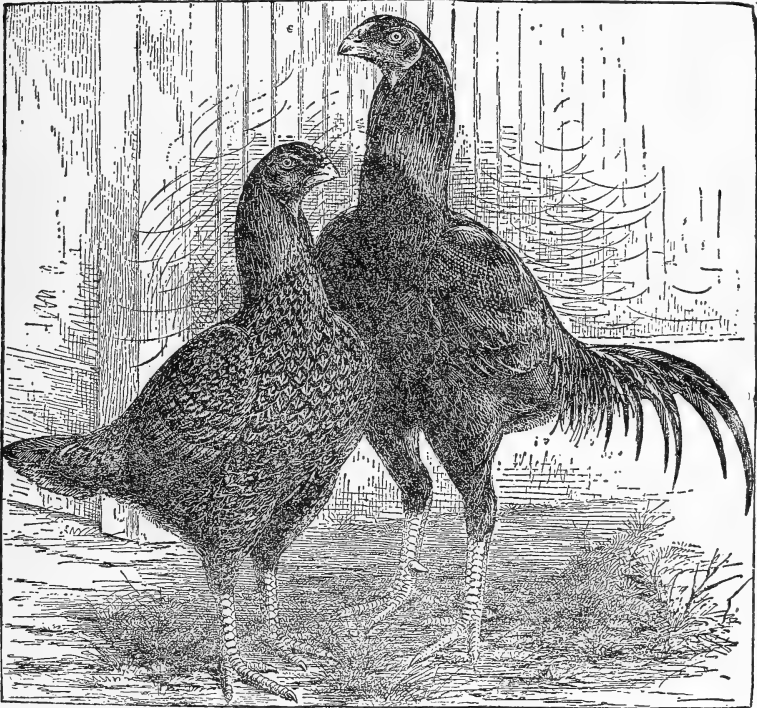
Leghorns are good layers, and their eggs are fair size, the White Leghorns laying the largest eggs and the greatest number.

They are a hardy fowl, bear confinement well, will thrive on any soil, but are not first-class as a table-bird. They are small eaters, and when at liberty will hunt diligently for food. As a producer of eggs for market it is one of the best breeds that can be kept.



OLD ENGLISH GAME.

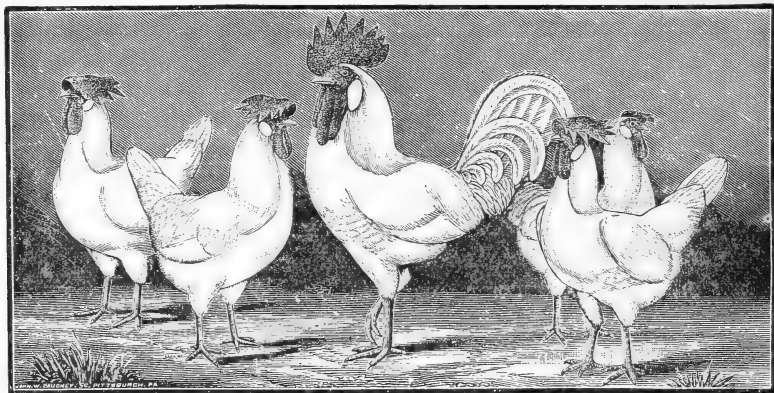
Game. This is without doubt the oldest of the pure English breeds, and for generations has been bred with great care and skill. In former years game fowls were bred for cock-fighting, and courage and endurance were the points most considered. But with a higher standard of taste, and the laws against this cruel pastime, cock-fighting is done away with, except such as is carried on secretly. Unfortunately, the fighting



INDIAN GAME.

qualities remain, and for this reason it is difficult to keep pure bred games. But for crossing purposes they are the very best, because all kinds of games are fair layers, splendid sitters, attentive mothers, have finer eating flesh than any other domestic fowl, are easy to rear, and can be kept on any soil when at liberty. If the crossing is judiciously done these characteristics can be largely retained, and the fighting qualities lessened.

Minorcas. This is a fowl of Spanish origin, which has been carefully bred in the south-western part of England. A few years ago their

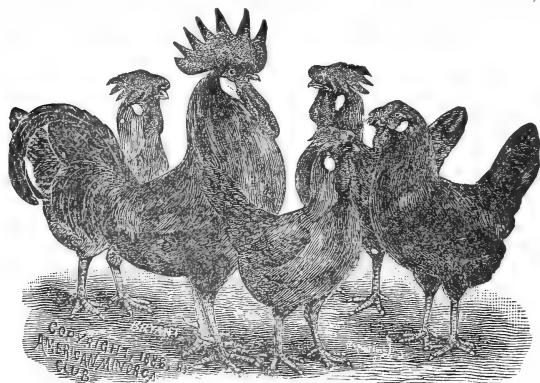


WHITE MINORCAS.

great laying qualities attracted the attention of the outside world, and they have become very popular. They are hardy, easily adapt themselves to all soils and conditions, (whether confined or free to run), produce large eggs in abundance, and get their full growth young. They are one of the most desirable breeds, being great egg producers and non-sitters. They surely merit their position as the first among the laying breeds of poultry.

The Minorcas are called by many "Red-faced Spanish," because in shape and appearance they much resemble the Black Spanish. It is possible that the two breeds were once the same, both having red faces, but

that the Spanish having been bred to produce the white face, lost much of the good qualities and strength of the Minorcas.



BLACK MINORCAS.

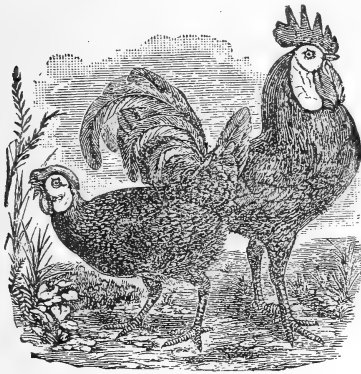
In shape they resemble the Leghorns, but have a larger comb, red face, white ear-lobes, and clean legs. We give illustrations of the two kinds, the black and the

white, but the white are very scarce and not so desirable as the black for general purposes. The black is a fine all-around bird. Their metallic black plumage makes them a "bird of beauty."

They are among the best as layers, and can be kept on any soil, are good fowls to hunt for their food, and small eaters.

Black Spanish. This breed is a small eater, a great layer of large eggs, bears confinement well, and formerly merited all that could be said in its favor. It was at one time the most popular of all breeds, but that was before it was ruined by the breeders. The fanciers have bred points, the main one being the white face, until the original bird has lost its strength and become a tender bird.

Though bred in this way, it is still a good producer of eggs, but the chickens are tender and hard to rear, slow in feathering, and the moulting of the full-sized bird seems to be attended with difficulty, and it is not a first-class table bird.



WHITE FACED BLACK SPANISH.

There are a few strains which not having been bred for exhibition, retain their old qualities. In these the White face is not prominent, but they are difficult to get. If crossed with the Black Minorcas strength will be secured

and without injury to the laying qualities.

The Black Spanish must be kept warm and in a dry soil. The chickens need special care, and the adult fowl during the moulting season requires special treatment. They have bright black plumage, white face, sweeping tail, and black legs. The comb is single, laying over in the hen, but erect in the cock.

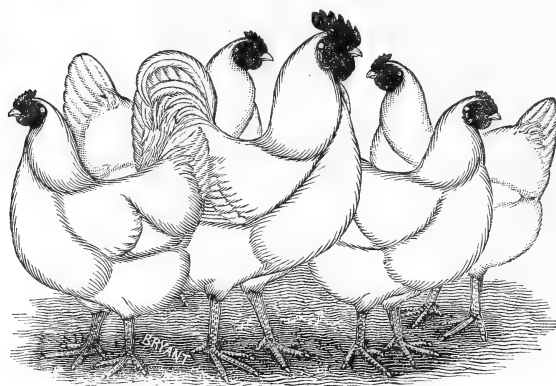
Hamburgs. The Hamburgs have the record of being the best laying breed in existence. It is not an unusual thing for the hens to produce two hundred eggs a year. But as the eggs are small and the fowls do not bear confinement, they are of little use to the general farmer.

They are now generally regarded as the fanciers' fowl, because of their great beauty. The cock has a neat head, beautiful plumage, close compact shape, sweeping tail, pure ear-lobes, and a handsome, well-shaped rose comb. The hen is rich in color, sprightly in carriage, and

neat and saucy. There are five varieties, the black, the gold penciled, the silver penciled, the gold spangled, and the silver spangled. Of these the most useful are the blacks, being the largest and laying the largest eggs.

If this breed is crossed with some other that will increase the size of the eggs, the result will be profitable, provided they are given plenty of room. If confined it needs a very high fence to restrain them, but on a farm where they can run they will do well. A few fowls can of course be kept in a confined position, but where there are sixty or more they need room. Under these conditions the Hamburgs are hardy, easy to raise, and non-sitters, and where the number of eggs is of more importance than the size, they make a very useful fowl.

White Plymouth Rocks. This useful bird, which originated in old Massachusetts, is very popular wherever it goes. There are three varieties; the barred, white and black. Their bodies are large, the full-



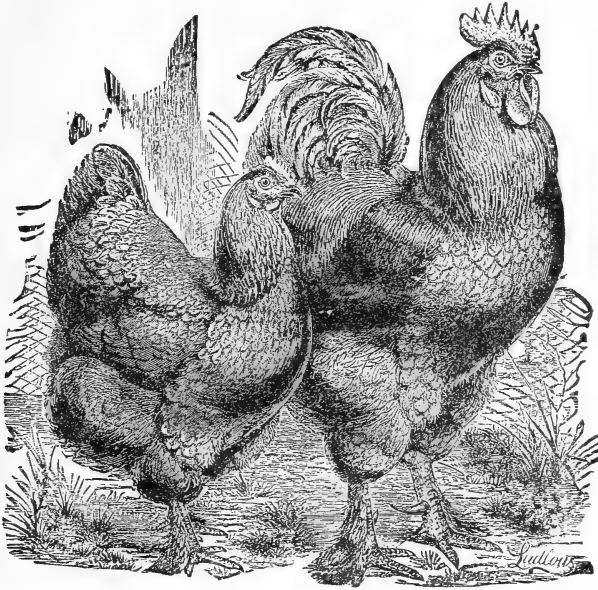
WHITE PLYMOUTH ROCKS.

grown bird often weighing from ten to twelve pounds; their legs are yellow and strong; are fair layers of small eggs, rich in flavor; their flesh is tender and sweet, and they have a good supply on the breast. They are very hardy, and can be kept on any soil, and bear being shut in very well.

They are fair sitters and good mothers. They are great favorites and compete with the popular Leghorns for first place, as a general utility fowl.

Dominique. The Dominiques have not become a fowl of general favor. It has many good qualities and would, if it could be procured pure bred, well pay any one who would raise them. They are of American origin, and look some like the Cuckoo Dorkin, but the Dominiques have a rose comb. They are a hardy fowl; will thrive on any ordinary soil; and are good table birds; capital layers; good sitters and mothers. They have the much sought for yellow legs.

Langshans. This breed of fowls resembles the Black Cochin, and there is much contention regarding its origin. It was introduced into this country from England. It is an improvement on the Cochin in everything but beauty, since the Langshan is a splendid layer, a fine table bird, not a determined sitter, and a most valuable fowl for general purposes, and the cochin is the opposite of all these.



LANGSHANS.

The Langshan is a large bird, which has long, slightly feathered legs. It has a single comb standing upright; plumage of a beautiful metallic lustre; very hardy; easily reared; bears confinement; very faithful mother; and a fair sitter. It is a very valuable bird, and its beautiful bright plumage makes it very attractive.

Dorkings. This is one of the oldest and best preserved of all English pure-bred fowls. They are a great table fowl but not great layers. The hens when full grown weigh eight pounds, and the cocks from ten to twelve. Their bones are small and there is great quantities of flesh on their deep breasts.

The birds are tender and while enduring any amount of cold, they can not endure dampness.

Classification of the Characteristics of the Various Breeds.

We herewith classify for convenience the various breeds under their general characteristics. In selecting a variety for profit, all the circumstances should be considered. The amount of confinement, the soil, and the care that can be given, are elements that must not be overlooked in selecting the fowls. Then determine whether there is wanted a table fowl, or egg producers or a general-utility breed. A careful study of the conditions and a judicious selection of the stock will be rewarded by profitable results, provided the flock is properly cared for and managed.

GOOD LAYERS, TABLE FOWLS, AND SITTERS.

Plymouth Rocks, Wyandottes, and Langshans.

GOOD MOTHERS AND SITTERS.

Dorkings, Games, Dominiques, Plymouth Rocks, Langshans, and Wyandottes.

NON-SITTING BREEDS.

Hamburghs, Minorcas, Leghorns, Andalusians, Houdans, and Spanish.

TABLE FOWLS.

Dorkings, Houdans, Langshans, Plymouth Rocks and Wyandottes.

ON CLAY SOIL.

AVOID Dorkings, Spanish, and Polish.

CHOOSE Minorcas, Leghorns, Houdans, Langshans, Game, Andalusians, or Wyandottes.

FOR VERY CLOSE CONFINEMENT.

Minorcas, Leghorns, Houdans, Plymouth Rocks or Wyandottes.

THE DISEASES OF POULTRY.

Causes. Naturally birds have but few diseases, but there is no doubt but that these few have been greatly fostered and increased by the system of keeping fowls which is now in vogue. The over-feeding upon rich or unsuitable foods, the over-crowding and confinement, and the keeping upon the same ground year after year, the in-breeding for points, the exposure by sending to shows, have a tendency to make birds subject to various diseases to which they formerly were strangers. It is much better to prevent diseases than to try to cure them after attacking the fowl.

As a preventive of the spread of diseases, where there is a fair sized flock, it is best to destroy the sick bird immediately, provided there is any indication of a contagious disease.

It is somewhat difficult to recognize diseases of chickens, as the bodies are covered with feathers, and there are so few ways in which the diseases can be determined. Still there are symptoms to be found accompanying all diseases that may by a little careful examination be discovered, and from these it is possible to determine what is the matter with the fowl.

Never let a fowl that shows any signs of illness remain for a minute with the flock. Put the diseased fowl in a separate place, where chloride of lime has been sprinkled. It is well in case of contagious disease breaking out in a flock of birds, to well disinfect the grounds and house.

If a fowl is seen moping or refusing its food, remove at once. If the illness proves to be a contagious disease, the remainder of the flock may be kept free, and if it is not, certainly no harm has been done.

Crop-bound. Occasionally a fowl is unable to pass the food from the crop into the gizzard, and the crop becomes so filled with food that it hangs like a bag in front of the bird. Although the crop is full, the bird will if not relieved die of starvation, because no food will pass into the stomach, so long as the obstruction continues.

Try and soften up the food by pouring some warm milk and water down the throat, and kneading the crop with the hands. If taken in time this usually effects a cure. If it does not, make an incision into the crop, through the skin, and remove the contents with a very small spoon, being careful to remove every particle. Then wash out the crop with warm water, and sew up the incision, first the inside skin, then the outside, with silk or horse hair. Feed the fowl on soft food without water, for a few days and the cure is effected.

Gapes. A very common disease of chickens is known as gapes, on account of the constant gaping of the mouth. This is caused by a small worm which gets into the throat, and if not removed by the chicken sneezing or by the hand, the chicken soon dies of suffocation.

It is difficult to determine the cause of these worms and where they come from, but it is sufficient for us to know they are there and must be removed. They may sometimes be prevented by applying to the heads of newly-hatched chicks mercurial ointment, but in other cases all efforts to get rid of them are in vain.

Fumigating with carbolic acid is without doubt the most effectual cure, and where many are affected with it, it is worth considerable trouble to save their lives. Another and most common method is to remove the worms by using a small quill feather dipped in turpentine. This is passed into the throat, where it is twisted around and suddenly jerked out, thus removing the worm.

Some place the chicks in a box or barrel and dust them with fine lime and ashes, which gets into the throats of the chickens, causing them to sneeze and throw out the worms.

In fumigating with carbolic acid or dusting, care should be taken not to carry it so far as to suffocate the young birds.

Apoplexy. Birds in fine condition are often found lying on the ground in a helpless condition, unable to move or stand. This is apoplexy, and is caused by overfeeding, by which is meant not only too much food, but also too rich food, especially the latter. Indian corn is a very rich food, and it has been found to be the cause of this disease in many instances. If there is a death in the flock from apoplexy, take it as a warning that the remainder of the flock are subject to the same disease, and if you would save them reduce the food in quantity and quality. The helpless bird may be saved by bleeding on the under side of the wing and by feeding on light food for some time.

Feather Eating. This disgusting habit is seldom found among birds that are free to roam, and even in confinement it is principally found in the Asiatic varieties and Houdans. When the habit is once formed it is very difficult to cure, and it is best to remove any bird found with the habit, and if not valuable, kill it; at the same time try to remove any cause that may exist.

Idleness is the great cause, so give the fowls a chance to run, and some fresh soil, in which has been mixed bone meal. Put a small quantity of salt in their food and give plenty of water. The following translation from a French Poultry Journal indicates the measures that are most successful toward breaking up this bad habit :

"The cause appears to us, to be attributed to the general discomfort felt by all classes of poultry during the cold weather, and especially the east winds. The poor things, huddled together in a sheltered corner, dare not come out in the open unless at feeding time, and then they never scratch about nor look for insects, grass, or those little nothings which constitute the essential part of their food, and which is found in every run well attended to. Under these circumstances the want of ani-

mal food has made itself felt, and the opportunity and temptation being within their reach, they have pulled at one another's feathers, which they eat with evident satisfaction. The only immediate remedy is to set them at liberty, but as this cannot be done in every case, one has to be satisfied with the means at his disposal. Let them have, several times a day, green-meat. Mix with the soft food, some meat cut up into small pieces. Avoid tainted meat. Renew the sand in the runs, and especially put dry sand under the sheds where the fowls generally dust themselves. Care must be taken with a hen, although not picked herself, but always pursuing the others, to isolate her. One single bird is sufficient to set a bad example. In small runs it is the cock which is generally picked first. Is it from excess of affection, or is it spite and revenge? It is difficult to say. At all events, he seldom resents it, and allows himself to be plucked without resistance. In this case the best way to protect him, is to rub him over with a sponge dipped in paraffine. In repeating this operation two or three times, at an interval of some days, the hens will entirely cease to strip their lord and master."

Cholera. This disease is epidemic in its attacks, and is seldom seen in any other country. It attacks isolated flocks and yards having poor drainage or care, and often nearly depletes them. It is undoubtedly malarial in character; and is very rapid in its action and termination. The poison of the malaria affects the liver, poisons the blood, and causes violent diarrhea. The fowl having this disease appears droopy, weak, in high fever, has rough and draggled plumage, and is very thirsty. Its droppings are of a greenish color. The following pill is highly recommended :

60 grains Blue Mass.

25 grains Camphor.

80 grains Cayenne Pepper.

48 grains Rhubarb,

6 drops Laudanum.

Mix and make into twenty pills, giving one every four hours till they act freely, and when they have acted follow with a tea-spoonful castor oil and ten drops laudanum to each fowl.

Diarrhea. This complaint must not be confounded with "cholera," and it can be readily distinguished by a difference in the color of the droppings and the attendant symptoms, which are very marked in a case of cholera. A simple diarrhea can usually be checked by the use of bonemeal as a food. Boiled rice mixed with pounded chalk will often stop it, and if possible to check it by either of these remedies, it is best

to do so. When these remedies are not sufficient to check the disease, give chlorodyne in water as prescribed on the bottle.

Roup. This is a very contagious and fatal disease, and when it once gets into a flock is very difficult to get rid of. Especial care is necessary to see that it is not communicated from one fowl to another, and as long as there is a case of roup about the place wash all dishes every day with carbolic acid water, and the houses should be lime-washed once a week. The affected bird, of course, will be separated from the flock, and as soon as it is positively known that roup is the disease, killed off at once, and very deeply buried.

The bird seems to have a cold, but roup is known by the offensive breath, swollen face and eyes, and a discharge from the nostrils.

If this attacks a very valuable fowl and it is desirable to try and cure, the following remedies may be successful. Wash the face, nostrils and mouth with chlorinated soda to kill the mucus which gathers there. Give sulphur or charcoal to cure the scrofula symptoms, and copaiba capsules for the cold.

Common Cold, or Catarrh. This disease in poultry produces the same symptoms that it does in man, namely: a running at the nose, and a slight swelling of the eyes. It arises from exposure, and if not attended to, may result seriously. To cure the cold the bird should be kept in a warm place and have doses of copaiba capsules, and be given nutritious food.

Bronchitis. Common colds sometimes settle on the bronchial tubes instead of in the head, and the fowls are seen constantly coughing without any other signs of a cold. These symptoms are caused by bronchitis. Generally all that is necessary to cure is to remove the bird at once to a warm, moist atmosphere. A warm day should be chosen to return the fowl to its former house. If the cold lingers, give one grain of calomel and one grain of tartar emetic each morning till an improvement is seen.

Disorders of the Egg Organs. Bad feeding sometimes is the cause of the delicate mechanism by means of which the egg is formed and voided getting so disordered that it can not perform the functions of nature. These organs may be disordered by lack of a sufficient supply of shell-forming material, which results in soft-shelled eggs. Birds that are free to run generally find enough of the shell-forming material, so that they are rarely troubled with this difficulty. Occasionally a hen becomes egg-bound. When this happens inject into the oviduct a little

castor or olive oil. Handle the bird carefully, as rough treatment may easily break the egg. Such a circumstance is usually followed by a fatal result.

Cramp. Chickens are sometimes seen with their toes curled in, and later are found walking on their knuckles. This is cramp, caused by being upon a clay or damp soil. To cure, place the chicken upon a perfectly dry floor, and feed on corn-meal with warm milk. Bathe the feet in warm water, rub dry and paint with turpentine.

Consumption. This is often an hereditary disease, and when so it can not be cured, but there is a form caused by damp, dark, badly ventilated houses. The bird gradually wastes away, there is a continual mucus discharge from the mouth, and a cough, and the poor bird soon dies, leaving simply a mass of bones and feathers. If the disease is acquired it may be cured if taken in time. The best treatment is good housing, wholesome and abundant diet, and capsules of cod-liver oil with quinine. Do not breed from any bird that has had the consumption, even though apparently cured.

Diphtheria. This disease seldom makes its appearance in ordinary poultry yards, being chiefly confined to exhibitions, and the ordinary keeper need not fear the disease except when buying birds.

Its indications are, severe cold with high fever, and in the throat white spots are seen filling the glottis. Any bird so affected should be immediately killed, as it is very contagious, and when once it gets into a flock it is seldom driven out without the sacrifice of all the birds.

Bumble-Foot. This disease is largely confined to the Dorkings and Houdans. It is caused by a wart-like substance appearing in the ball of the foot, which, if allowed to grow, will cause the bird to become so lame it can not walk. The cause is high perches and constant walking on stone or cement floors. The wart-like substance should be cut out with a sharp knife, and the part touched with nitrate of silver, after which the fowl should be kept on a floor thickly covered with cut straw. If very much inflamed do the foot up in cloths, which should be kept wet with cold water.

POULTRY KEEPING FOR FARMERS.

The following paper was read at the Farmer's Institute at South Easton, New York. It is from the pen of O. B. Wilbur, one of the most practical farmers in the country. We give it because of its great value and practical suggestions:

"The question, 'Is it profitable for a farmer to engage in the raising of poultry?' can only be answered by considering many of the conditions under which the farmer is compelled to work, the help which could be depended upon from the other members of the family, the convenience to a ready market, the adaptability of himself or some member of the family to the work of disposing of the surplus product and many of the circumstances which enter into the life of every industrious and hard working farmer's family.

The most essential thing contributing to the success of any business is a liking of the person for that business. You can as well expect a person who dislikes the care of horses or cattle to become a successful stock raiser as look for a man who cares little for the fowls to succeed in the poultry business. A love for the work is necessary in this as in any other business. If a person has this satisfaction in caring for his poultry, there will be no other part of the farm work which will give him more thorough enjoyment than this.

The next most important question is, 'Will it pay?' There is no doubt some of us present who would enjoy hitching up a high-spirited, mettlesome horse, one which has known nothing of the pressure of a hame collar upon his shoulders, or the fatigue of a hard day's work before the plow, take our little family into the carriage and drive into the village on a pleasant summer afternoon to do our shopping and show our valuable roadster. I haven't the slightest doubt but what this would be exceedingly gratifying to many of us, but I hardly think it would pay the average farmer to keep a horse which is too high-spirited or valuable to do the ordinary routine of farm work.

In the same way, it might be suited to our tastes to care for and exhibit at the numerous shows, valuable thoroughbred poultry, but this question, 'Will it pay?' is the one which interests the most of us in the greatest degree.

To the question, 'Will it pay the average farmer to keep poultry in connection with the almost infinite variety of work which is found upon all general farms,' I answer most emphatically, yes. If the work of

caring for poultry is as well done as other work, I think there is hardly any other kind of work on the farm which will prove so remunerative. But we can not keep hens and neglect them and expect to realize much profit from them. With proper care a flock of hens on almost any farm might be made to pay clear of all expenses from one dollar to two dollars per head, and even more than that in many cases. I had much rather have invested fifty or one hundred dollars in good laying hens than an equal amount in sheep, hogs or cows.

If a man should tell me his fifty dollar cow had turned over to him a clear profit of two hundred dollars in a single season, I should be inclined to question his veracity, but should he or a dozen others say that from their flock of fifty-cent hens they had in the same length of time cleared above all expenses two dollars per head, I should not question them for a moment, but would say, well done; I am glad you have found the secret of success in poultry raising.

In the brief time which can be given to this paper, I can only outline a few of the requirements necessary to the successful prosecution of this part of the farm work.

The first thing is a suitable place in which to keep your fowls. One need not necessarily go to the expense of erecting a costly building for a hen-house, although were I to keep only twenty-five or fifty hens, I should prefer to build a good substantial building separate from all others, for a poultry-house, for the reason that so few farm buildings would have a room which could be fitted up suitably for the purpose. In locating a building a dry spot should be selected, if possible sloping to the south, then you can have your yards south of the house, thus being protected from the cold north winds of winter, and in the spring the warm, sunny days will quickly melt the snow so the fowls can sooner get to the ground and scratch to their heart's content.

The plans for building a hen-house are as numerous as the number of people building them, but whatever the details of the plans are, it is necessary to keep in mind that the house must be made comfortable and warm, being free from cracks through which the wind can penetrate, causing an indefinite number of diseases among your feathered tribe. Of the two extremes, little ventilation or large cracks and holes in the wall, I should by all odds choose the former. I tried one winter to keep my house thoroughly ventilated by opening trap doors in the ceiling up into the loft, but I found my fowls were constantly being attacked with sneezing and colds in the head. Since then I have kept the trap doors

closed, even in the heat of summer, preferring to ventilate from below the fowl's resting place, and they have continued free from disease.

In building a hen-house, there is a tendency among amateurs to get too many windows. Anything like an even temperature can not be maintained when a large part of one side of the house is glass, unless by means of shutters, curtains, or something of that kind. In the daytime when the sun shines, you will have summer weather inside, but at night the rapid radiation through the glass causes the temperature to rapidly fall to a low point, thus exposing the fowls to great extremes in temperature.

Do not crowd too many fowls into a limited space. The usual rule is to allow ten square feet of floor area for each hen, and I have no doubt but what more money can be made per hen if they are given this amount than if confined to closer quarters. I have, however, considered this question from another standpoint, which is this. Many of us can keep more hens in summer than our house will accommodate in winter, were we to allow the usual ten square feet of space to each hen, so unless we feel like enlarging the house, we must keep less in summer than we wish to, or put more in the house in the winter than the rule will allow.

Now, I look at it in this way, that it is the total profit at the end of the year which we realize that we are looking after, so if I can make but two dollars per hen by wintering one hundred, it is better than three dollars per head for fifty. I thus prefer to lessen slightly the profit in winter that they may be increased in summer when the hens can run at large and pick up a considerable part of their living.

Hens, to do their best, must have the most liberal hand to feed them, and their bill of fare should be almost as varied as that of human bipeds. Perhaps the plan which I attempt to follow in my own case may prove of some interest to you. Every other morning the first thing I do after I get up is to put a pail of small potatoes in the oven to bake, and by the time we have our chores done and breakfast eaten they are ready to take out and mash. I bake them for the simple reason that at this time in the morning the oven is usually unoccupied, whereas the top of the stove is being used in getting breakfast, so have no chance to boil them without making a separate fire. After they are mashed I add some water or skimmed milk, a small handful of salt, and every two or three mornings a tea-spoonful of Condition Powders, tincture of iron, powdered charcoal or half tea-spoonful of cayenne pepper. Experience teaches me just how much water to put in, so that when the meal

is added, the whole will form a crumbly mass, being neither sloppy nor containing dry meal.

The mornings when I do not bake potatoes as a basis for mash, I have soaked over night in boiling water a quantity of clover heads and leaves, which have fallen off the clover hay as it is pitched out of the mow to feed. I have a clover cutter, but as this plan is handier than cutting the whole hay, I have adopted it. The meal of which the mash is made is composed of two parts of corn and oats ground together, two parts wheat bran, two parts wheat middlings, and one part of either buckwheat middlings or rye shorts and some chopped boiled meat, and frequently to this is added a handful of either oil meal or cotton-seed meal.

At noon their food consists either of oats or buckwheat scattered in the wheat chaff which covers the floor about four or five inches in depth. At night they are given about all the corn or wheat they will eat. This is also scattered in the chaff, if they have time to scratch it out before they go on the roost, if not, I put it in the trough. I say, about all they will eat, for when they stuff themselves completely full at night their appetite in the morning is not so good as I would wish, and as the morning feed is cheaper than the evening meal, I endeavor to have them have the best appetites, when I can fill them up on good egg-food for the least money. I endeavor to have a constant supply of pure water before them, also a supply of coarse ground bone, ground oyster or clamshells, and—by the way—I much prefer clamshells, for they act partially as grit, besides supplying the lime necessary for the egg-shell and coarse ground charcoal, together with plenty of grit of some kind.

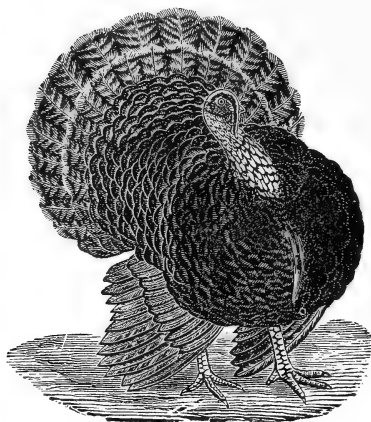
Heads of cabbage are hung up in convenient places for them to pick at during the day, and specked apples, beets, etc., are frequently given. I suppose a more varied diet might be given to them, but this seems to agree very well with the constitution of my flock, so I have adopted it.

The question is often asked, what is the most profitable breed to keep. To this question I always answer, it all depends upon the fancy of the person keeping them, and the purpose for which they are kept. If a person seems to fancy Cochins, or Brahmas, or Langshans, or any of the large breeds, and wants to raise poultry for market, the variety which suits his fancy is the one for him, for he will do better with the breed which pleases him, and there is no very great difference in the value of the different varieties, if meat is what they are looking

after. In the same way, if you fancy the Spanish, the Hamburg, the Andalusians, the Minorcas, or the Leghorns, and keep fowls for the number of eggs which they will produce, I say, choose the variety which best suits you.

So, if your object is to produce the greatest number of eggs for the least money, you don't want any of the larger breeds; or if your object is the production of meat, you do not want any of the Mediterranean breeds. I think, however, most farmers are better adapted to a union of the two objects, and desire a fowl which will lay a good quantity of eggs, and at the same time have a good sized carcass when a chicken is desired for the table, so would recommend some of the varieties of Plymouth Rocks or Wyandottes, or some other of the medium-sized fowls.

I will close by saying that no farmer should expect to be successful in poultry-raising, unless he takes and carefully reads some of the numerous papers devoted exclusively to the raising and care of poultry. An enterprising farmer can not afford to be without an agricultural paper, and in no part of farm work should there be more deviation from the old style of farming than in the care of poultry. So I consider it necessary for a live, energetic farmer, to take at least one good wide-awake poultry journal."



BRONZE TURKEY.

THE POTATO.

Fungi and Bacteria Affecting the Potato.

LATE BLIGHT OR DOWNY MILDEW, EARLY BLIGHT OR
LEAF SPOT DISEASE, BACTERIAL BLIGHT, THE
POTATO SCAB, ETC.

THE diseases of the cultivated plants caused by fungi inflict upon agriculture an enormous loss. Scientific investigation has been carried on by the governments in various parts of the world, and the recent experiments in spraying with arsenites for the destruction of insects, and the copper solution or Bordeaux mixture for the treatment of fungous diseases, proves that a large proportion of this enormous loss might be saved by their applications.

This chapter is devoted to the fungous enemies of the potato. The enemies of our fruit plants and trees are described under "FRUIT CULTURE."

Late Blight or Downy Mildew. This disease is caused by a fungi, (*phytophthora infestans*) which generally appears rather late in the season. Its attacks are usually sudden and fatal, the plants that are affected often being entirely destroyed in a few days.

The tubers are usually affected; rotting and giving off during the process a foul odor. This disease spreads very rapidly during warm, moist weather, and at such times it is very destructive.

The first indication of its presence is the appearance of brownish spots upon the leaves in the shape of a downy mildew. These spots gradually enlarge and finally the whole leaf turns dark brown or blackish.

Soon the remainder of the leaves become affected and the whole plant eventually wilts and dies.

At the first appearance if the plants are sprayed several times with Bordeaux mixture its ravages will be prevented.

A large number of the potato maladies of this country have until recently been attributed to this fungus. Late investigations show that there are other diseases that attack the potato, for which the Late Blight has been held responsible. There is however one consoling fact whether we are able to differentiate between this and other troubles or not, and that is, that the remedy for this disease is likewise effective in those for which it may be mistaken.

Early Blight or Leaf-Spot Disease. This disease which appears early in the summer is caused by the fungi called the *macrosporium solani*. It shows itself in the shape of small, brown brittle spots which are scattered over the leaf. If a careful study is made of the leaf it will be found that their upper surfaces are somewhat roughened by darker spots which are raised above the dead tissue which assumes a gray color. These spots are at first small but they slowly increase in size and finally run together and form large brown patches between which is found the leaf becoming yellowish or sickly green in color. The plant finally withers and dies before the tubers are half grown. This fungus is difficult to study in the potato field, because the spores are produced on only a portion of the affected plants. It winters over in the spore stage on the dead vines. Potato vines should always be burned, and if the disease has appeared one year give several early applications of Bordeaux mixture. Do not plant potatoes on the same field the next season.

Bacterial Blight. There is a potato disease due to bacteria. Since it develops in the tissues that are attacked by the fungus just described it is probable that the two have been confounded. There seems to be this difference however, the bacterial blight develops in all parts of the plant, and generally starts from the seed planted which rots in the ground. This disease is most troublesome in warm climates and is shown by the early death of the plants, they oftentimes suddenly wilting and the young potatoes decay.

Treatment of Diseases of the Potatoes. Experiments show that these diseases may be prevented by spraying with the Bordeaux mixture. Vines thus sprayed remain in a healthy condition long after

untreated vines are dead, thereby developing larger potatoes and consequently a greater yield.

At the experimental station in Rhode Island two rows in the center of a field were not treated with the Bordeaux mixture and the leaves blighted and dried up soon after August 1st., leaving only the bare, dead stems, while the plants in the rows that were treated remained with their leaves green and healthy. When the potatoes were dug in the fall the untreated rows yielded marketable tubers at the rate of thirty-three barrels per acre, while the others averaged ninety-seven barrels per acre.

The first application of Bordeaux mixture should be made when the vines are one-third grown or earlier if the disease appears. If it is washed off by rain repeat after two weeks. If the Colorado beetle is present add half a pound of London purple or Paris green to each forty gallons of Bordeaux mixture.

Potato Scab. Nearly every farmer is more or less familiar with the disease of potatoes called "scab." It is scientifically named *Oospora scabies*. Farmers have noticed that this disease is most prevalent in fields that have been heavily fertilized by barnyard manure. This is supposed to be caused by the stock being fed with potatoes that have been affected by the scab. The spores of this disease do not seem to lose their fertility during digestion and passes out into the compost to be spread over the field and attack the developing tubes. It can often be seen on partially developed scabby potatoes in the shape of fine white threads running over the surface. Repeated experiments show that if scabby potatoes are planted, scabby potatoes will be dug in the fall.

Treatment. Dr. Roland Thatcher after many years of study and experiment describes the preventive measures as follows:

1. The seed must be freed from scabs.
2. Land that has produced scabby potatoes must not be planted with potatoes in less than three years.
3. Land planted with potatoes must not be fertilized with manure from stock that have been fed scabby potatoes or beets.
4. Scabby potatoes should not be fed stock raw, but should always be thoroughly cooked, even if the land on which the manure is to be placed is not to be immediately planted with potatoes.
5. Any other fertilizer is to be preferred to barnyard manure, even if free from droppings of animals fed on diseased potatoes.
6. If the potatoes show evidence of "scab" dig as soon as mature, be-

cause if left in the ground the diseased spots spread and deepen.

7. The disease may be prevented by placing the seed (cut if desired) in coarse sacks like coffee-sacks through which liquid will readily pass and soak for an hour or two in the following: to two ounces of finely pulverized corrosive sublimate (mercuric bichloride) add three gallons of hot water and allow to stand over night or until it is dissolved. To this add twelve gallons of water and stir thoroughly for five or six hours. The potatoes after being in the liquid for the required time should be dried before being planted.

CAUTION. Plant all potatoes treated. This solution is a deadly poison, but at this strength is not dangerous unless taken into the stomach. The poison being corrosive should only be placed in wooden vessels. NEVER USE METALLIC VESSELS.

Bordeaux Mixture. This fungicide originated in France. For directions how to make see page 540.

How to Prepare Carbonate of Copper. Dissolve in a barrel twenty-five pounds of copper sulphate in hot water. In another barrel dissolve thirty pounds of sal soda in hot water. Allow both solutions to cool, then slowly pour the solution of sal soda into the copper sulphate solution, stirring the same. Fill the barrel with water, and allow the precipitate of copper carbonate to settle. Upon the following day siphon off the clear liquid. This operation washes the carbonate free of most of the sodium sulphate which contaminates it. Make a filter of stout muslin, by tacking the same to a square wooden frame, which will just fit over the top of the second barrel, letting the muslin hang down loosely so as to form a sack; through this filter the precipitate, so as to drain off the excess of water, and as the filter fills remove the precipitate, and allow it to dry in the open air, when it is ready for use.

Carbonate of copper is commonly used in the form of an ammoniacal solution, made by dissolving four ounces of carbonate of copper in two quarts of ammonia, and then adding to a barrel of water. The carbonate will dissolve more readily if mixed with water enough to form a paste before it is added to the ammonia. It is a simple fungicide, easy to make and apply, and as it is a clear solution there is no trouble with it clogging nozzles.

Standard Receipts.

THOROUGH INFORMATION IN PLAIN LANGUAGE

RELIABLE AND SCIENTIFIC.

Practical and Valuable Remedies.

COMPREHENSIVE, THOROUGH AND EASILY UNDERSTOOD.

Good Samaritan Liniment or Pain Killer. This is one of the best liniments made. It affords relief in bruises, sprains, burns, rheumatism, neuralgia, and headache.

2 quarts 95 per cent. Alcohol,	1 ounce Spirits of Turpentine,
1 ounce Balsam of Fir,	1 ounce Chloroform,
1 ounce Oil Sassafras,	1 ounce Oil Hemlock,
1 ounce Tincture Catechu,	1 ounce Tincture Guaiacum,
2 ounces Oil Origanum	$\frac{1}{2}$ ounce Gum Camphor,
$\frac{1}{2}$ ounce Oil Wintergreen.	

Dissolve the gum camphor and oils in the alcohol, before adding the other ingredients.

Rheumatic Liniment. This can not be surpassed for human ailments, such as, rheumatism, sprains, bruises, lameness, etc.

1 ounce Oil of Spike,	1 ounce Gum Camphor,
1 ounce Oil of Wormwood,	1 ounce Oil of Hemlock
2 ounces Sweet Oil,	1 ounce Oil of Origanum,
1 ounce Spirit of Ammonia,	1 pint Alcohol.

Mix well together and keep well corked. By adding one ounce spirits of turpentine it makes an unequalled horse liniment.

OINTMENTS.

Camphor Ointment. This is an ointment which will be of benefit to ripen (bring to a head) tumors.

2 ounces Adeps (Lard),
1 ounce Powdered Gum Camphor.

Mix thoroughly. This is to be applied by putting on cloths and placing over the sore.

Pile Ointment. This when faithfully used will relieve the itching burning sensation so common to this annoying disease. Keep the bowels loose and regular, and be careful of the diet.

2 ounces Adeps (Lard),
1 ounce White Wax,
3 scruples Powdered Opium,
6 scruples Flour of Sulphur.

Melt together the lard and wax, stirring constantly till cold, then add the other ingredients.

Wonder Ointment. This ointment should be in the cupboard of every family, to use in case of burns, scalds, cuts and sores. It is healing and soothing. Gather your roots while you can, and prepare a few boxes.

1 pound Root of Yellow Dock,
1 pound Root of Dandelion,
 $\frac{1}{2}$ pound Root of Plantain.

Put to steep in water and extract the juices. Press out the juices after steeping. Strain carefully and simmer the liquid till half its original bulk. Add some oil and fresh butter and again simmer till all the water is gone. Then box and keep ready for use.

Iodoform Ointment. This remedy is largely used to heal sores caused by syphilis.

1 dram of Iodoform.
15 drams of Adeps (Lard).

Add sufficient alcohol to make into an ointment. This has been used with success in many very severe cases.

Tar Ointment. This is a popular remedy among the Southern people, who use it for scalds and burns.

6 ounces Tar,
8 ounces Mutton Tallow.

Melt together and stir till cold. It is an excellent remedy for scald-

head and ringworm. For scald head, first wash the head well then apply the ointment.

Carbolic Ointment. This salve should be used, when there is the least danger of "proud flesh." It is what is known as the antiseptic treatment. That is the treatment that will destroy the germs of the air, that often are absorbed into wounds and prevent their healing.

1 fluid dram Carbolic Acid,
4 ounces Adeps (Lard),

Melt lard at a gentle heat, add the carbolic acid and stir till cold.

Cucumber Ointment. A soothing ointment good for allaying the feverish condition of the skin, or chapped hands or lips.

6 fluid ounces Oil Sweet Almonds, 2 ounces Spermaceti,
 $\frac{1}{2}$ ounce White Wax, 1 fluid ounce Glycerine,
4 pounds Green Cucumbers.

Chop the cucumbers into small pieces, and mash them in a stone jar, let them lie in their own liquor over night, then press and strain. Melt the spermaceti and wax together and add the almond oil. Set the pan in which the melting ingredients are, into a larger pan of boiling water. When melted, add to it the strained cucumber liquid, stirring all the time so as to have them thoroughly mix. Set on cellar bottom or in an ice-box till cold, then stir with wooden spoon, when the watery portion of the cucumber will separate from the ointment; pour off this watery portion and then mix the glycerine with the ointment without heating by thoroughly working with a spoon or the hands. Put into jars and cover with a few drops of rose water. Keep in a cool place.

PLASTERS AND BLISTERS.

Plasters. These are extensively used for holding together the edges of cuts or wounds. They are also according to their composition used to relieve pain, reduce swellings or soothe inflamed surfaces. Substances which, when applied to the skin produce a redness and increase of heat, are often the main part of what is commonly called a plaster.

Blisters. A substance applied to the surface of the body to cause a secondary morbid action, with the view of relieving one already existing, is called a blister.

Adhesive Plaster. This is the well known adhesive plaster, so much used for drawing together the edges of a cut or wound and holding them in position, till healed. It is also used to protect from the air and further injury portions of the body when the skin has been accidentally removed. It is slightly stimulating and it is supposed to aid in the healing process.

$1\frac{1}{4}$ pounds Litharge,
1 quart Olive Oil,
1 gill Water.

Mix with an iron spoon, in a well polished copper kettle the litharge and water, then add the oil and boil, stirring all the time until the plaster is sufficiently hard when cold. This process requires considerable time. Take:

5 ounces of Above Mixture,
1 ounce Resin.

Mix by a moderate heat, and spread thinly upon muslin, or linen. A thin paper moistened with olive oil, and then wiped dry, may be laid over the surface and the plaster rolled up, put in an air-tight tin tube and be ready in emergencies.

Court Plaster. This plaster is merely a kind of varnished silk. By following the directions here given, a very superior article is the result. It will not crack nor break, which makes it far superior to much that is on the market.

$\frac{1}{4}$ pound of Isinglass.
 $\frac{1}{2}$ pint Proof-Spirits of Wine,
1 ounce Balsam of Peru,
- Silk on which to apply.

Dissolve the isinglass in as small a quantity of warm water as possible. Let it simmer on the back of the stove till the water is well out, then supply its place by the spirits of wine which will combine with the isinglass. Strain through a piece of muslin, and have it reduced in quantity till like a jelly. Tack the silk tightly on frames, and with a camel's hair brush apply three coats of the prepared isinglass, which has been made liquid by gently heating. Do not put on the second coat, till the first is dry. After the isinglass coats are dry, give the surface two or three coats of the balsam of Peru.

A Corn Cure. Cut a piece of paper the size of a one-cent piece, and in the centre of this cut a hole the size of the corn. Put this over a piece of adhesive plaster cut to the same size, and warm the plaster

shown by the hole. To this small portion add a little nitrate of silver. Remove paper and apply to the corn. A couple of applications seldom fail to cure.

Strengthening Plaster. This an excellent plaster to relax the muscles and for weak joints caused by sprains and bruises.

6 ounces of First Part of Adhesive Plaster,
1 ounce of White Resin,
 $\frac{1}{2}$ ounce each Yellow Wax and Olive Oil,
1 ounce Red Oxide of Iron.

Rub the oxide well into the oil, melt the other parts and add. Mix well together. Spread the plaster on leather, cut into narrow strips and wind around the sprained joint.

Mustard Plaster. This will furnish an ever ready mustard plaster which is far superior to the untidy, annoying wet plaster so often used.

$\frac{1}{2}$ pound Pulverized Black Mustard Seed,
6 ounces Mucilage of Gum Arabic.

Cover paper or smooth cloth with the mucilage and dust over the surface the powdered black mustard seed. The strength will depend upon the amount dusted on the surface. When dry put away in air-tight fruit-jar. When wanted plasters of any size can be cut from the roll.

Spanish Fly Blister. This is a strong and active blister, which will act quickly and powerfully.

6 ounces Burgundy Pitch,	2 ounces Beeswax,
9 ounces Venice Turpentine,	6 ounces Cantharides,
$\frac{1}{2}$ ounce Powdered Mustard,	$\frac{1}{2}$ ounce Powdered Black Pepper.

Mix over heat but it must be less than boiling water.

POULTICES.

Poultices. These are generally made of substances that will take up and hold large quantities of water, and retain a soft condition. Their power to cure depends upon the heat retained by the poultice and the liquids with which they are mixed. Milk will not evaporate as quickly as water. Glycerine added to a poultice will aid in keeping it soft. A layer of mosquito netting between the poultice and the skin will keep the mass together so that there will be no trouble in changing the poultices when fresh ones are needed. Poultices should be kept

warm and moist by covering the outside with oil-silk, a sheet of gutta-percha or India-rubber cloth. A square cut from some old gossamer, will be the best that can usually be obtained.

Slippery Elm Poultice. This poultice will remove inflammation sooner than any other. It is used to allay pain and hasten suppuration. It is extremely valuable in boils and ulcers.

1 pound Slippery Elm Bark,
 $\frac{1}{2}$ ounce Tincture of Myrrh.

Stir in hot or warm milk or water, enough of the slippery elm bark to make a poultice of the required size, stir thoroughly and add its proportion of the tincture. Apply warm and keep it moist by covering.

Flaxseed Poultice. This poultice is of much value because it will not crack when it becomes dry.

2 ounces Powdered Flaxseed,
1 gill Hot Milk or Water.

Prepare by slowly sprinkling the flaxseed into the liquid, all the time thoroughly stirring with a spoon.

Charcoal Poultice. This poultice should always be used with ulcers or with any sore that has a tendency to mortification. The charcoal is an antiseptic which has great purifying properties, as well as the power to destroy the offensive smell coming from putrid sores.

1 pound Powdered Flaxseed,
 $\frac{1}{4}$ pound Powdered Charcoal.

Add hot water or milk to make it the proper consistency. Add some glycerine to keep it soft. The following may be used if preferred:

4 ounces Dry Bread,
1 pint Boiling Water,
2 ounces Powdered Flaxseed,
1 ounce Powdered Charcoal.

Soak the bread in water till soft, add the flaxseed and three-fourths of the charcoal. Before applying, sprinkle the remainder of the charcoal over the surface of the poultice.

Soap Poultice. This is an old fashioned remedy having much virtue. It is of greatest value in scalds and burns.

2 ounces of Scraped White Soap,
 $\frac{1}{2}$ pint Boiling Water.

Dissolve the soap thoroughly in the water and use the liquid for mixing with sufficient bread or flaxseed to make a poultice.

HOW TO PRODUCE SWEATING.

Perspiration. Colds may be "broken up," by a good "sweat" that would otherwise terminate in a long run of fever. Common remedies are usually at hand; and it is only necessary to know how to use them. Take a sweat as soon as a cold is noticed.

Boneset Tea. A valuable remedy that can be always at hand. Gather the boneset while in blossom or procure at the drug-store.

2 ounces Boneset,
1 quart Boiling Water.

Boil for half hour. Take four table-spoonfuls as hot as possible every thirty minutes. This will produce a profuse perspiration,

Sweating Tea. This will produce sweating in many of the most obstinate cases.

2 ounces Pleurisy Root,
3 Pints Water.

Simmer for half hour. Take a tea-spoonful as often as the stomach will bear it.

Sweating Drops. Take a tea-spoonful of peppersauce upon sugar before going to bed. Cover up warm, and a good sweat will be the result.

EMETICS.

Common Emetic. An emetic that can be obtained at a moments notice is sometimes essential. This may be obtained at almost any home, and is a reliable emetic.

2 tea-spoonfuls Common Salt,
2 tea-spoonfuls Mustard.
1 glass Warm Water.

Drink all the stomach will take.

Emetic Syrup. This is a valuable emetic, and a family having children should never be without a bottle of this syrup.

1 ounce Simple Syrup,
1 ounce Wine of Ipecacuanha,
2 ounces Water.

Mix and take from one-half to one ounce every quarter hour till vomiting takes place. For a child give twenty drops or more according to age

WORM REMEDIES.

Symptoms. The symptoms denoting worms are quite common to the various species. The surest is to find them in the passages of the bowels. The other symptoms are: starting during sleep; grinding of the teeth; itching of the nose; and indigestion with a variable appetite.

Stomach Worms. To expel these from young children use the following faithfully and success will follow:

2 ounces Fluid Extract Pink-root,
16 grains Santonine.

Mix and give a child two years old one tea-spoonful night and morning, until it physics.

Pin Worm Remedy. The thread or seat worm may be washed away by an injection of quassia which has been soaked for twenty-four hours in water enough to cover. This should be followed by doses of the stomach worm remedy. It is well to take a tonic after the expulsion of worms.

COUGH REMEDIES.

Cough Mixture. A large number of cough remedies contain some form of opium, as laudanum or paregoric, which while having the desired effect upon a cough has a tendency to constipate the bowels, which has to be overcome by a cathartic. The following is a valuable remedy which does not constipate.

4 ounces Iceland Moss,	4 table-spoonfuls Pearl Barley,
2 ounces Tincture of Lobelia,	4 ounces Poppy Capsules,
$\frac{3}{4}$ pint Molasses,	4 quarts Water,
$\frac{3}{4}$ pound Sugar Candy.	

Mix all together excepting the candy, and boil down to three quarts, then dissolve in it the candy. Dose, one table-spoonful when the cough is troublesome.

Cough Mixture No. 2. This is a valuable remedy for coughs and hoarseness.

2 ounces Horehound,	1 ounce Comfrey Root.
2 ounces Boneset,	1 ounce Spikenard,
2 ounces Lobelia Herb,	1 ounce St. John's Wort,
1 ounce Poppy Capsules,	$\frac{1}{2}$ pound Loaf Sugar,
4 quarts Water.	

Mix all together excepting the sugar and let stand in warm place for

three hours, then add sugar and boil down to a syrup. A table-spoonful is a dose.

Valley's Mixture for a Cough. This remedy while being a valuable remedy has the feature of being pleasant to take. Children will not refuse the medicine.

1 tea-cupful Flaxseed,
1½ ounces Powdered Licorice Root,
¼ pound Chopped Raisins,
2 quarts Water.

Put the licorice root and raisins into the water and boil till the strength is extracted, then add the flaxseed which has been soaked over night. Let all boil for an hour, watching and stirring to prevent it from burning. Boil in a rice-kettle if it can be obtained. Strain and add lemon juice and granulated sugar to taste. Take a tablespoonful whenever cough is troublesome, and the same quantity warm just before retiring.

Hive Syrup. This old and well known remedy has been changed some in the composition, substituting sugar for honey. When made of honey it fermented almost invariably. Made after the following receipt it will keep without spoiling. Largely used in croup.

1 ounce Squills,
1 ounce Seneca Snake-Root,
1 pint Water.

Boil down to one-half and strain. Add one-half pound of sugar and twelve grains tartrate of antimony. Dissolve the sugar by agitation without heat. Dose, as an expectorant for adults twenty to thirty drops. For children five drops as an expectorant. As an emetic which may be repeated every fifteen or twenty minutes till vomiting is the result, give ten drops to a tea-spoonful.

Hive Syrup, No. 2. This can be prepared by purchasing the compound syrup of squills, instead of making the same as in the first receipt.

6 ounces Compound Fluid Extract Squills,
48 grains Tartar Emetic,
40 fluid ounces Simple Syrup.
1 fluid-ounce Hot Water.

Dissolve the tartar emetic in the water, and with the other ingredients.

Murphy Cough Syrup. This combination is specially useful for asthma, hoarseness, and coughs.

1 ounce Blood-root,	1 ounce Slippery Elm Bark,
1 ounce Colt's Foot,	1 ounce Elecampane,
2 ounces Spikenard Root	2 ounces White Root,
$\frac{1}{2}$ ounce Comfrey Root,	$\frac{1}{4}$ ounce Snake Root,
$\frac{1}{2}$ ounce Poplar Bark,	$\frac{1}{2}$ ounce Horehound,
1 gill Molasses,	1 quart Water,
1 pint Holland Gin.	

Mix all together excepting the gin, and let simmer for one hour. When cool strain and add the gin. Dose, one table-spoonful every hour, or three tablespoonfuls three times a day.

Blood Root Syrup. This is one of the standard remedies and is of great value in bronchial troubles, coughs, and difficult breathing.

5 ounces Bruised Blood Root,
3 ounces Sugar,
3 pints Water.

Simmer gently till it thickens, then add one table-spoonful of paregoric. Dose is one table-spoonful occasionally, for a child one tea-spoonful or less according to age.

To Cure a Cold. Often a cold is accompanied with an annoying cough. The following remedy is very soothing and healing.

3 pounds Pine Needles,
$\frac{1}{2}$ pound Loaf Sugar.

Steep the needles in water and boil down. Add the loaf sugar and boil till it thickens. Drink of it while warm, during the day and before going to bed.

MEDICATED SYRUP.

Simple Syrup. The solutions of sugar in water more or less strong according to the use for which it is intended are known as syrups. If care be taken in the manufacture and only the best of sugar and pure water be used the danger of fomentation (working) is largely avoided.

There is one proportion which is considered standard among druggists and is known by them as simple syrup. Often times the manufacturer of medicines requires weaker syrups, and the dishonest druggist uses them instead of the standard.

Two pounds of the best quality of loaf sugar to a pint of water. This should be boiled in copper until if a little be placed between the forefinger and thumb, on opening them it will be drawn into a small thread. A little of the white of an egg well beaten, put in before set on the fire; and placing it so it will simmer not bubble nor boil, will clarify the syrup by rising to the top. As soon as the scum appears, take off the scum, and let it simmer, taking off the scum until the syrup becomes clear, and the scum as white as milk. To prevent granulation add half dram of acetic acid to each pint of syrup.

Rhubarb Syrup. Rhubarb is well known as a gentle physic, but it is bitter and unpleasant to the taste. Prepared as a medicated syrup it loses its unpleasant taste.

3 ounces Fluid Extract Rhubarb,
1 pint Simple Syrup.

Mix, and shake the bottle a few times during the day. Then filter next day and it is ready for use.

Rhubarb and Senna Syrup. Rhubarb and senna in combination operate quicker as a physic than rhubarb alone.

2 ounces Rhubarb Root,
2 ounces Senna Leaves,
 $\frac{1}{2}$ ounce Cardamon Seeds,
1 quart Dilute Alcohol.

Put the senna leaves, cardamon seeds, and the rhubarb root (bruised) with the alcohol into a well covered fruit can, and let stand at least two weeks in a moderately warm place, shaking it at least twice a day. Then simmer to one-half the quantity, strain and add half pint of simple syrup.

Sarsaparilla Syrup. This is the basis of the sarsaparillas sold on the markets as patent medicines. Sarsaparilla is not considered at the present time by the medical fraternity as possessing much virtue, but it is largely used as a medium in which to take other medicines.

1½ pounds Sarsaparilla,	3 ounces Guaiacum Wood,
2 ounces Licorice Root,	2 ounces Pale Rose Senna,
3 pints Diluted Alcohol.	

Mix and allow to stand in closed vessel forty-eight hours. Filter through a very slow filter, that will not allow the liquid to pass through faster than a drop at a time. Add dilute alcohol occasionally till the result is about ten pints. Evaporate over steam or water to five pints. Add and thoroughly mix five drops each, oils of sassafras and anise and

three drops oil of gaultheria, which have been thoroughly rubbed with a small portion of the solution.

Chamomile Syrup. This preparation is as clear as the syrup and has the advantage of being quickly prepared.

4 ounces Fluid Extract Chamomile,
12 ounces Simple Syrup.

Dose is from two to four drams, or two to four tea-spoonfuls.

MEDICINAL ESSENCES.

Peppermint. This an old and reliable remedy. Much that is sold at drug and grocery stores is far from being up to the standard strength.

1 ounce Oil of Peppermint,
 $\frac{1}{2}$ ounce Peppermint Herb,
1 pint Spirits of Wine.

Let stand for a week or more till the peppermint herb colors it to a pale tint of green. This coloring process is not necessary, nor is it necessary to use any of the herb in the above, but many people prefer to have the essence of this pale green color.

This is a strong essence, the usual strength being one ounce of the oil to a quart of the spirits. A dose of the strong would be about ten to twenty drops.

Wintergreen. Often used in the place of peppermint. Ordinary strength is as follows:

1 ounce Oil of Wintergreen,
1 quart Spirits of Wine.

Dose, from twenty to sixty drops.

Jamaica Ginger. This is an inexpensive and easily prepared tincture of ginger.

$\frac{1}{2}$ pound Jamaica Ginger,
3 pints Spirits of Wine.

Bruise the Jamaica ginger and let stand two weeks. Then press and strain. Dose, one tea-spoonful.

Essence of Beef. A very valuable remedy for nourishment, when a person is not able to digest more solid food.

1 pound Lean Beef,
 $\frac{1}{2}$ pint Water.

Chop the beef very fine and put in a quart bottle, then add the water.

Put the bottle into a kettle of cold water, and put over the fire. Let it boil violently for half an hour. Then pour off the liquid and boil the remaining meat in one pint of water for the same time. Strain both liquids and mix. Flavor with salt and pepper and put while boiling hot into air tight bottles or cans. Keep in a cool place.

Bitter Essence. This is a well known tonic and stomatic. It is usually taken combined with mixtures.

1 ounce Gentian Root,	$\frac{1}{4}$ ounce Bitter Orange Peel,
$\frac{1}{4}$ ounce Wormwood,	$\frac{1}{4}$ ounce Blessed Thistle,
12 ounces Alcohol.	

Mix and let stand for two weeks, shaking occasionally. Strain and it is ready for use. Dose from one-half to two tea-spoonfuls.

Tincture of Camphor. The tincture of camphor of the stores is not as strong as the spirits of camphor previously described. The tincture of camphor of the stores is about

9 drams Gum Camphor,
1 quart Alcohol.

The spirits of camphor can be reduced and made of the strength of this solution by adding spirits of wine.

To Color Essences. As a matter of appearance the tinctures are often times colored. The best method is to steep a portion of the herb of which the tincture is made in a little water for several hours. The essence of cinnamon is often colored with the tincture of red sandal wood.

HOW TO MEASURE MEDICINE.

Measures and Equivalents. For the sake of convenience, in the absence of proper instruments, we often make use of means of measurements, which are not precise nor uniform, yet are sufficiently accurate for ordinary purposes. There are a few common household implements which correspond to a certain extent with the regular standard measures.

- 1 Tea-spoon holds about 60 drops.
- 1 Tea-spoon holds about 1 fluid dram.
- 1 Dessert-spoon holds about 2 fluid drams.
- 1 Table-spoon holds about 4 fluid drams.
- 1 Thimble holds about $\frac{3}{4}$ of a fluid dram.

- 1 Wine-glass holds about 2 fluid ounces.
- 1 Tea-cup holds about 4 fluid ounces.
- 1 Coffee-cup holds about 8 fluid ounces.
- 1 Tumbler holds about 8 fluid ounces.
- 1 Pinch of leaves weighs about 1 dram.
- 1 Handful of leaves weighs about 10 drams.

Doses at Different Ages. The doses of medicines at different ages vary. Children and aged people should receive less than the ordinary dose. Opiates should be given in less quantities than other medicine, because they seem to take greater effect on the young. The following table will give the dose as usually administered.

Under six months one-sixteenth of a full dose.

Under one year one-thirteenth of a full dose:

Under two years one-seventh of a full dose.

Under three years one-fifth of a full dose.

Under four years one-fourth of a full dose.

Under seven years one-third of a full dose.

Under ten years five-elevenths of a full dose.

Under fifteen years one-half of a full dose.

Under twenty years two-thirds of a full dose.

TO PREVENT CONTAGION AND BLOOD POISONING.

Antiseptics. In cases of wounds it is often the case to find that poisonous germs existing in the air are absorbed, and the wound does not heal properly because of the germs producing putrefaction in the injured tissue. Blood-poisoning may follow the absorption of these microscopic organisms. Certain agents have the power of destroying these poisonous germs, and are known as antiseptics.

Deadly Poisons. Some of the most valuable antiseptics are among the deadliest poisons, even in very small quantities. They should never be used except under the direction of a physician. People who are wounded should insist on antiseptics being used. If the attending physician refuses or neglects his duty in this respect, choose another. Among the antiseptics corrosive sublimate is the best known. It occurs in the form of small, white granules, and is very poisonous. It is used by dissolving three grains in a pint of hot water. A small quantity of glycerine placed upon the corrosive-sublimate, before adding the hot water will hasten the solution. This solution is used in washing and

cleaning the wound. Carbolic acid, salicylic acid, blue vitriol, iodoform, sugar, and alum are all among the antiseptics.

Disinfectants are agents which have the power of destroying or neutralizing infectious matter which is the product arising from those suffering from a contagious disease, as small pox, measles, scarlet fever, and a variety of other sources, as sewers, cess-pools, decaying matter, etc. Disinfectants are used in solid forms or in solution to destroy the infectious germs contained in the clothing and cesspools, and often found in the apartments of the sick.

Fumigation is disinfection by means of a gas instead of by the use of solids or solutions. This is very valuable in disinfecting air, and articles which would be destroyed by wetting.

Precautions Against Contagious Diseases. While disinfections destroy the germs left behind by a disease, yet it is well to observe all precautions possible to prevent contagion. Should a pupil be taken ill of a contagious disease in a school-room or in a family, the room should be fumigated before those who have not been exposed to the contagion should be allowed to enter. The patient should be removed to the top of the house or to a distant part of the dwelling. Before doing this remove from the room to be occupied by the patient everything not needed for the comfort of the sick. No one should be allowed to enter the room except the one caring for the patient, and that person should communicate with the family as little as possible. All clothing and bed linen should be disinfected before removing from the room. Even the dishes should receive proper attention. The attendant should be careful never to eat or drink anything that has been standing in the room. As the patient recovers, several warm sponge baths should be given, with an antiseptic solution consisting of three grains of corrosive sublimate to a quart of water, before leaving the room. Clothing that has not been kept in the room should be placed upon the patient immediately preceding departure.

Dead bodies should be wrapped in linen saturated in a solution of corrosive-sublimate of fifteen grains to a pint of water, or a solution of six tea-spoonfuls of carbolic acid to a pint of water. The corrosive-sublimate has not a disagreeable odor, while carbolic acid is more or less unpleasant.

A Few Disinfectants. In the sick room fresh air and cleanliness are always at hand. Besides these we have

BRIMSTONE (Roll Sulphur) for fumigation.

COPPERAS (Sulphate of Iron), one and one half pounds to a gallon of water is used in cesspools and sewers.

COMMON SALT AND SULPHATE OF ZINC (White Vitriol), four ounces of each to a gallon of water to disinfect clothing and bed linen.

CORROSIVE SUBLIMATE, (Bichloride of Mercury), sixteen grains to a quart of water, is used to receive discharges from the body, when the patient has cholera, typhoid fever, etc. The quantity used should equal the amount of discharge. This is very poisonous, and must be used with greatest caution.

CHLORIDE OF LIME. This is a very valuable disinfectant, but it will discolor clothing that has coloring matter in them that will be attacked by the free chlorine given out from the compound. Clothing is best disinfected by common salt and sulphate of zinc. Use chloride of lime, one pound to three gallons of water, to sprinkle on floors and wash out sinks that are offensive. Dry chloride placed in rat-holes from which come offensive odors, will soon purify the atmosphere. It should be used in urinals, night commodes, water-closets, privy-vaults, butcher stalls, slaughter-houses, fish-markets, pig-pens, and stables, especially if the latter are near the house. Use it freely whenever a contagious disease or an epidemic of any nature is in the neighborhood.

How to Use Disinfectants. All clothing, towels, and bed-linen before removing from the room, should be placed in a tub of boiling salt and zinc solution. All discharges should be received in vessels which contain either the corrosive-sublimate or the copperas solution.

Prevention of Diphtheria. Every person in contact with a person afflicted with diphtheria should use disinfectant gargles as a preventive. A physician should prepare the gargle and give directions for its use.

Prevention of Typhoid Fever. This disease is largely transmitted through the passages from the bowels. Some one of the disinfectants should be used in the commode, allowing the stule to pass directly into the liquid prepared as suggested. Corrosive-sublimate, (bichloride of mercury), is the most efficient. Sulphate of zinc, (white vitriol), is also very valuable. If proper care be taken in this regard there is very little danger of typhoid fever being transmitted to another person.

Scarlet Fever and Measles. These diseases, while disinfection does not prevent their being contagious, seem to be modified by the

proper use of disinfectants. Often those attacked by the disease, where disinfectants have been properly used, have it in a much modified form.

Typhus Fever and Small Pox. Do not for a moment neglect the use of disinfectants, and use them freely. Do not burn rags nor clothing that have been on the patients, but drop them in some strong disinfectant fluid.

How to Fumigate. Every opening, such as doors, windows, ventilators, and chimneys should be tightly closed. All blankets, bedding, and other articles which cannot be treated to the zinc solution should be hung on lines in the room. All colored articles should be thoroughly dry, because if moist the fumes will destroy some of the colors. Mattresses and upholstered furniture should be taken apart. The hair or other filling should be treated to the zinc solution, while the other parts should be exposed.

Take a wash tub or barrel and place in it bricks on which to set an iron kettle. Pour water in the tub or barrel until it nearly covers the bricks. Place in the iron kettle, which sets on the bricks, roll sulphur and set it on fire by means of hot coals, or with the aid of a little alcohol poured over it and then ignited. About three pounds of sulphur, should be used to every thousand cubic feet. Keep the room closed at least twenty-four hours, after which thoroughly air.

Cesspool Disinfection. To every five hundred pounds of the estimated contents use one pound of corrosive sublimate in solution. Sprinkle chloride of lime daily over the contents during epidemics and at least every two weeks at other times.

To Disinfect Sinks and Drains. These often become very offensive and are always a source of danger, breeding diphtheria and malarial fevers, unless properly disinfected. Copperas dissolved in water, one-fourth of a pound to a gallon, and poured into a sink and water drain occasionally will keep them pure and wholesome. One-half pound of chloride of lime to a gallon of water will have the same effect.

Where large quantities are used to disinfect vaults or stables, a home made preparation as follows will be very efficient: dissolve one bushel of salt in a barrel of water, and with this salt water slack a barrel of lime. This should make the lime wet enough to form a thin paste. If not add more water.

To Disinfect a Cellar. A damp musty floor may be sweetened by sprinkling upon the floor pulverized copperas or chloride of lime.

Cellars that have contained potatoes, carrots, turnips, cabbage or other vegetables during the winter should be thoroughly disinfected early every spring by sprinkling the floors, walls, and bins that held the vegetables, with water that contained one-half pound of chloride of lime to the gallon.

Deodorizers are agents which destroy or neutralize the offensive odors arising from decaying matter or in the sick room. They may or may not have the power of destroying contagious matter, their use being to mask unpleasant odors. Those that have disinfectant properties as well as deodorizing, are carbolic acid, chloride of lime and chloride of zinc. The simple deodorizers are burning cotton, paper, or coffee. A portion of chloride of lime placed on a plate on the mantel is a very good constant deodorizer.

How to use Deodorizers. Chloride of zinc, an ounce to a quart of water, sprayed about the room occasionally is an effectual means of destroying offensive odors.

Chloride of Lime used as above suggested.

Use the disinfectants as suggested for the discharges from the body. Burn paper; cotton, or coffee. and let the smoke pass in the room.

Chlorine. This is a very powerful disinfectant. It is a green gas and attacks chemically nearly all contagious matter. It is used in the form of gas which is generated and allowed to pass into the rooms. If this is generated in cellars where vegetables and other articles mold it will destroy the fungus. It is very penetrating and has bleaching properties. Articles that would be injured by this gas should be removed and disinfected by other means.

Fragrant Odor. A pleasant odor may be imparted to a sick chamber by a small quantity of the oil of sandal wood upon a hot shovel or on the top of a hot stove.

ACCIDENTS AND EMERGENCIES.

What to Do. If an artery is cut red blood spurts. Bandage it above the wound. If a vein is cut, dark blood flows. Bandage it above and below the wound.

If choked get upon all fours and cough. A sharp blow between the shoulders may help in expelling whatever is in the throat or œsophagus.

For slight burns, dip the part into cold water; if the skin is destroyed cover with linseed oil. Common baking soda is a good remedy for burns.

Send for a physician in case of a serious accident, but do what is here directed till he comes.

Clothing Catching Fire. If you see a person whose clothing is on fire, throw him to the ground and roll him over and over. Throw a coat, rug, carpet, or any blanket at hand over him. The object of this is to prevent the flames being swallowed.

Scalds and Burns. These are common accidents, and an understanding of what to do may save a life and much suffering.

The first, best, and often the only remedies necessary are sheets of fine wadding or cotton and flour or chalk. The object is to exclude the air, because if the air is excluded, and care is taken not to expose the tender part till a new skin is formed, nature generally effects a cure. In case of a scald or burn cover immediately the part with a sheet of wadding or cotton, taking care not to break any blister that may have formed, or even waiting to cut away burnt clothing that may adhere to the surface. Cover immediately to keep out the air. A coating of oil over the cotton is a great help in keeping out the air. A light bandage to firmly hold the cotton in place should then be used. When there is no cotton at hand, cover the wound with flour.

IF THE SKIN IS BADLY INJURED and the cotton can not be readily obtained, cover some linen with fresh butter or lard and lay the same over the part, and give the patient if much exhausted, a little brandy. If not much injured, yet very painful, dip cotton in lime and linseed oil and apply. If nothing else is handy scraped raw potato may be used, or put on common molasses and dust the surface over with flour.

Cuts and Wounds. Clean-cut-wounds, whether deep or only superficial, which are likely to easily heal, should be washed with an antiseptic lotion, and then evenly and smoothly closed by bringing both edges together and securing them in that position by adhesive plaster. Cut the adhesive plaster into thin strips and fasten on one side of the cut, then bringing the parts of the wound together, edge to edge fasten the loose end. Ordinary cuts are easily dressed in this way, but if the cut be large and the edges difficult to hold together some assistance from a second person may be necessary.

Bruises or "Black and Blue Spots." Put on hot water cloths or if there is much pain, a hot poultice, renewing the same every two hours.

Dirt in the Eye. Dirt in the eye generally adheres to the upper

or lower lid. As the lower lid is the more easily examined it is well to see if the dirt is adhering to this part. This is done by standing in front of the person, and pressing the finger upon the flesh of the cheek-bone and drawing down the skin. Then if the dirt is in sight it can be removed by the moist corner of a handkerchief. If the dirt is not on the lower lid, place a match or knitting kneedle over the upper lid, and by pressing downward, and at the same time raising the upper lid it will be turned inside out. This will expose to view the offending particle which may be removed as before. The eye should then be bathed in cold water and the light excluded. If the inflammation is severe, put on cold tea leaves or scraped potato or bathe in salt and water.

Fainting and Fits. Fainting is caused by a lack of blood to the brain, which has been caused by the stoppage of the heart or the blood going to some other part of the body. Place the person who has fainted on the back with head low; loosen the clothing about the neck and chest; sprinkle cold water in the face; and apply smelling salts to the nostrils. Do not raise the head higher than the body, unless the face is red, or dark colored, which is an indication that it is not an ordinary fainting fit, and should be treated differently. In cases of this kind raise the person on a seat and put cold water on the head immediately.

PAINT AND VARNISHES.

When to Paint. Paints put on late in the fall or early in the spring, when the weather is cold and there is no dust or bothersome insects will last longer than if applied at any other time. The cold weather seems to delay drying and the paint hardens on the surface, often forming a surface that a knife blade will hardly penetrate.

Glossy or Dead Surface. Paint mixed with turpentine will give a dead surface, while one mixed with oil produces a gloss. When paints contain both oil and turpentine the paint loses its gloss in proportion as the oil is lessened and the turpentine increased. Paints should never be put upon a damp surface; let the boards thoroughly dry after rain or showers before painting. Never put on the second coat of paint till the first is thoroughly dry. Use a little more dryer when the weather is cold than when it is warm. Keep the paint thoroughly stirred so as to have it of a uniform thickness.

To Kill Knots Before Painting. Shellac varnish is most commonly used. If the paint is of a deep color shade, red lead may be mixed

with it to advantage. On the side of buildings where the sun strikes very directly in the afternoon, cover the knot with oil and glue-size, and apply the thinnest tinfoil that can be found. Silver leaf is better, less liable to come off and is not very expensive. It is the heat from the sun and stove that draws the pitch out of the knot through the paint.

Sticky Painted Surfaces. Often after painting it is found that the surface is sticky. The back of a chair may stick to a coat or dress, or the paint on the door stick to the hand on opening or closing. This can be overcome by giving the surface a coat of Japan and turpentine, which should be well rubbed in.

How to Mix Paints. The first named color is to be used in the largest quantity. The others according to the shade required.

Buff is made by mixing White, Yellow Ochre, and Red.

Cream is made by mixing White and Yellow Ochre.

Fawn is made by mixing White, Yellow, and Red.

Flesh is made by mixing White, Yellow Ochre, and Vermilion.

Gray is made by mixing White and Black.

Gold is made by mixing White, Stone Ochre, and Red.

Lemon is made by mixing White and Chrome Yellow.

Peach is made by mixing White and Vermilion.

Pink is made by mixing White, Vermilion, and Lake.

Rose is made by mixing White and Madder Lake.

Chestnut is made by mixing Red, Black, and Yellow.

Maroon is made by mixing Red, Black, and Medium Yellow.

Claret is made by mixing Red, Umber, and Black.

Copper is made by mixing Red, Yellow, and Black.

Violet is made by mixing Red, Blue, and White.

Dark Brown is made by mixing Red, Black, and Blue.

Orange is made by mixing Yellow and Red.

Olive is made by mixing Yellow, Blue, Black, and White.

Grass-Green is made by mixing Lemon Yellow and Bronze Green.

Snuff is made by mixing Yellow and Vandyke Brown.

Turkey-Red is made by mixing Vermilion and Black.

Cracks of the Floor. Use putty to fill the cracks of the floor, before painting; apply with an old knife, and smooth neatly. If the floor has never been painted before give it one coat before applying the putty.

Stain for Floors. If it is desirable to stain a floor that has been previously oiled, it is easily done by first washing the floor with strong

copperas-water, and when dry, rubbing it carefully with linseed-oil, giving it two coats. It can be kept bright by wiping it with a damp cloth.

Walnut Stain. Black-walnut stain may be made at home if the black-walnut bark can be procured. Slowly boil an ounce of the bark in a pint of water for an hour, and then add a lump of alum the size of a hickory nut to set the color.

Varnishing Old Furniture. Two common mistakes frequently made in varnishing are in preparing the article for varnishing and in using too much varnish. The furniture or woodwork should first be washed with soap and warm water to remove all dust and grease, and then wiped perfectly dry. Turpentine can be used to thin the varnish as the work proceeds. Woods finished in oil that look dull or cloudy can be freshened by rubbing them with a flannel cloth on which a little of the following mixture has been poured: equal parts of turpentine and linseed oil, put in a bottle and shaken until thoroughly mixed. The success of the work depends upon using a small quantity of the mixture, and plenty of friction.

To Not Injure the Gloss. This is at times an important matter, and has been a problem with those who have had much of it to do. The Palace car companies direct that the highly polished surfaces of the interior of their cars, be cleaned with a mixture of powdered soap and tripoli, in proportions of about three parts of soap to seven of tripoli, applied with a wet sponge. The slight solvent action of the soap does not injure the varnished surface, but it removes the dirt, and the grit of the tripoli, which must be very fine, cuts off such matter as the soap fails to remove.

How to Polish Furniture. Once the polish mixture is obtained the chief thing is the rubbing. Any lack of this will be sure to result in disappointment and failure. Skill is less requisite than perseverance.

Wax Polish. The ingredients for this simple polish can be found in nearly every household. It is a good polish and will keep well and be always ready for use.

2 ounces Beeswax,
 $\frac{1}{2}$ ounce White Soap,
1 pint Boiling Water,

Apply by rubbing a little with a cloth on a small space at a time, rub with a second cloth and polish with a third.

To Soften Varnish. Apply ammonia freely, using a sponge fastened to a handle, and as soon as the varnish softens it may be scraped away with a knife or a piece of glass. An application of strong spirits of camphor will remove almost any varnish or polish from furniture, but care must be taken to allow plenty of time for the spirits of camphor to evaporate before repolishing or varnishing, as the camphor will injure the new coat.

Resin Polish. The base of this polish is resin, and after the liquids are evaporated there is left a thin covering of very fine resin, which is very hard and glossy.

2 ounces Resin,	4 ounces Ether,
12 ounces Alcohol,	2 ounces Balsam Fir,
8 ounces Boiled Linseed Oil.	

Keep this polish well protected from the air, as it will soon evaporate and leave only oil and resin behind.

Simple Polish. A simple and reliable polish that is used to remove finger marks.

1 pint Olive Oil,
2 pints Vinegar.

Shake well before using and apply with a woolen cloth, after which rub vigorously with a dry cloth of the same material, or use a chamois instead.

Common Furniture Polish. Where the varnish of furniture has become old and much tarnished use this polish.

4 ounces Shellac,	1 pint Spirits Turpentine,
2 pints Alcohol,	4 ounces Ether,
3 pints Linseed Oil,	4 ounces Ammonia.

Mix thoroughly the shellac and alcohol, and then add the other ingredients. Shake well when using and apply with a sponge.

Oil Polish. When there are cracks in the varnish, this polish will fill them and make the surface appear new.

2 pints Linseed Oil,	2 ounces Butter of Ammonia,
$\frac{1}{2}$ pint Alcohol.	$\frac{1}{2}$ pint Spirits Turpentine,
$\frac{1}{2}$ pint Vinegar.	

Shake well before using and apply with a woolen rubber, that is a woolen cloth over a smooth piece of hard wood.

Finishing Polish. Take one-half pint spirits of wine, two drams shellac and two drams gum benzoin. Put these ingredients into a bottle

and keep it in a warm place until the gum is all dissolved, stirring it frequently. When cold, add two tea-spoonfuls of the best clear white poppy oil. Shake all well together and the polish is then ready for use. Keep well stirred while using.

This preparation is useful for finishing after any of the foregoing receipts; as it adds to the lustre and durability of the polish, and removes any defects left by the latter. It gives the surface a most brilliant appearance. It is used the same as the polishes; but in order to remove dull places the pressure in rubbing must be increased.

Olive oil and water, mixed in the palm of the hand, is said to be the best means of polishing pianos and organs. Mix and rub on vigorously with the hand.

French Polish. A method largely used in France for imparting to furniture a brilliant and lasting polish is described as follows: a solution is made by beating gum acacia and the whites of two eggs in a mortar until they thoroughly mix, then a half pint each of raw linseed oil and best vinegar are added, together with eight ounces methylated spirits of wine, one ounce hydrochloric acid, and two ounces muriate of antimony.

To use the French polish properly, only a very small quantity must be used at a time; and it must be applied with a rubber made with a ball of cotton wool covered over with a soft cotton cloth or linen rag. The ball is dipped into the polish, then covered over with the rag, and this dipped into a drop of linseed oil to prevent it sticking to the wood. Use the rubber gently, polishing from a centre in a circular motion. Finish with a drop of spirits of wine on a clean rubber, which will extract the oil. If there is any difficulty in getting polish to "take," rub the wood over first with a rag moistened with a little linseed or olive oil.

Re-Varnishing Furniture. When furniture requires re-varnishing, it should first be well washed with strong soda water, which will remove every particle of grease. Then wash with soft water into which a little vinegar, (oxalic acid is better) has been put. Try to neutralize the soda.

Wipe dry and coat with a good quality hard-drying varnish. When dry, rub off with a bunch of curled hair, to remove the gloss, and flow on a full coat of cabinet finishing varnish.

To Ebonize Pine. The wood is immersed for forty-eight hours in a hot, saturated solution of alum, and then brushed over several

times with a logwood decoction, prepared as follows: boil one part logwood with ten parts of water, filter through linen and evaporate at a gentle heat until the volume is reduced to one-half. To every quart of this add from ten to fifteen drops of a saturated solution of indigo, completely neutral. After applying this dye to the wood, rub it with a saturated and filtered solution of verdigris in hot, concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained. It must always be remembered when handling chemicals that great care must be taken to protect the hands.

WHITEWASH AND KALSOMINE.

Out-Door Whitewash. For the covering of out-buildings or fences that have commenced to grow rough from age, the action of the weather, or that need a cheap durable covering, this out-door white wash is without an equal. The zinc and salt hardens the wash and prevents it from cracking.

1 bushel Lime,
4 pounds Sulphate of Zinc,
2 pounds Common Salt.

Slack the lime by pouring boiling water over it in a closed barrel. Put water enough on to cover the lime about a foot deep. Stir continually until it is thoroughly slacked. A cream color may be made of this wash by adding six to eight pounds of yellow ochre. This can be readily applied with a whitewash brush.

United States Lighthouse Whitewash. The keepers of light-houses in the United States were directed by the department of the government having them in charge, to keep the stone and woodwork covered with this whitewash, using it as hot as it was possible.

1 bushel Unslacked Lime,
6 pounds Ground Rice,
1 pound Spanish Whiting,
2 pounds White Glue.

Slack the lime in boiling water then strain and add one-half bushel of fine salt, which has been dissolved in warm water. Put the ground rice in boiling water and boil to a thin paste. Dissolve the glue and the whiting in warm water. Mix and let stand for a week. Stir thoroughly and heat sufficient quantity to use. Put on with large painter's or whitewash brush. This will last almost as long as lead and oil.

Gloss Whitewash. This preparation applied in the manner indicated, will give a fine, smooth, glossy surface.

Mix with thin starch paste, a quantity of the oxide of zinc and apply with a whitewash brush to the sides and ceiling. Then apply a second coat in which the chloride of zinc has been mixed with the paste.

Kalsomine. Whitewash is composed of the milk of lime, but this after several coatings would form a thick crust on the walls, which would scale off, so various articles were tried till zinc white mixed with water and glue were found to be the most satisfactory. This combination is named Kalsomine, and has the advantage over common whitewash of being easily colored. One pound of Kalsomine when mixed according to the following will cover about eighty square feet of side wall or ceiling two coats.

For ceilings, use:

$\frac{1}{4}$ pound White Glue,
8 pounds Zinc White.

For side walls to prevent rubbing off, use

$\frac{1}{2}$ pound White Glue,
8 pounds Zinc White.

Soak the glue over night in water and liquefy over the fire next day. Then add more water and the zinc white. If too much glue is added it will be difficult to put on evenly, and it will be more liable to crack and fall off in scales.

Various coloring matter may be mixed with the Kalsomine to give almost any shade desired.

Brick Colored Wash For Walls. Brick foundations, sidewalls, or chimneys that it seems best to keep the color of the original brick, should have this preparation applied.

2 ounces Cheap Glue,
1 gallon Water,
 $\frac{1}{2}$ pound Venetian Red,
1 pound Spanish Brown.

Dissolve the glue in water and then add about one-half pound of alum. Heat and add the Venetian red and the Spanish brown. If too light in color add more red and brown.

Fence Wash. Slack the lime in boiling water and to each three gallons of the ordinary whitewash add one pound fine salt and one pint molasses. Two coats are sufficient.

TO REMOVE STAINS AND GREASE SPOTS.

Ink Stains. There are two kinds of ink stains, aniline and gall-nut. Many inks made now are aniline, so it is always best to treat all ink stains first with diluted tartaric acid, increasing its strength until the spot begins to disappear. Should this acid, however, have no effect then treat for ink made from nut-galls. The cloth containing the spot is spread out tightly over a bright, hot, tin plate and rubbed with a hot solution of oxalic acid, using a piece of iron to rub with, such as an iron key. It often happens that in silk goods nothing can be done to remove the stain.

Ink Stains on Table Linen. The best way to take ink out of table linen is to soak the spots in sour milk. Put the cloth in the fresh milk and set it where it will turn sour. The process of souring seems to assist in drawing out the stains. Rub the spots after they have been soaking twenty-four hours in the milk, (provided it has curdled in that time), just as you would wash any spot in water. They will finally become very faint and may now be washed out in water, and the first time they are put through the weekly washing the probability is that all traces of the ink stains will have disappeared.

Grass Stains. These are very readily removed by moistening with Stannous chloride and rinsing well in water.

Fruit Stains. Fruit stains in white goods must be bleached out with Javelle water, (see directions how to make), and well rinsed in clear water. Do not try soap except as a last resort, as it sometimes has the effect of setting the color and rendering the stain difficult to remove. For colored silks use warm water, Castile soap suds, and ammonia. This applies in general to all vegetable stains, including red wine and to red ink stains.

An old fashioned way of removing fruit stains is to pour boiling water upon them. This is best done by spreading the section of cloth containing the spot out firmly over a bowl or pan and pouring boiling water upon it from the spout of a tea-kettle.

Fruit stains are easily removed from table-linen by wetting the spots with spirits of camphor before being washed. If camphor is not at hand whisky will answer.

Acid Stains. Excepting those from nitric acid which are permanent, acid stains can be neutralized by the action of an alkali, strong ammonia usually being the most effective. If the stain is fresh and of

a red color, it will sometimes disappear by moistening it with water and holding over the mouth of a bottle of ammonia so that the fumes may come in contact with it. In general, however, the acid stain should be neutralized by the direct application, drop by drop, of strong ammonia, meanwhile watching carefully the colors of the fabric, so that they may not be injured.

Coffee Stains. Coffee stains may usually be removed by moistening the spots and holding them over the fumes of a small piece of sulphur placed in an iron vessel. Sulphur being an acid, the stained parts must at once be carefully washed with water containing a little soda or ammonia to save the fibre from injury. If a spot is quite small, it may be moistened and held over the fumes of a few sulphur matches. The vapor from burning sulphur will often remove stains that nothing else will affect. But the fabric must be immediately and thoroughly rinsed in every instance.

To Remove Paint. Paint and varnish may be removed by using turpentine, gasolene or benzine. On silk, ether gives the best results. Old spots on woolen goods should be covered with olive oil and allowed to remain for several hours; then treat with chloroform. This applies also to all resinous stains.

Kalsomine Stains. Kalsomine yields at once to water and acetic acid, though like all stains, even these simple blemishes may be fixed in cloth, if unduly experimented with.

Iron Rust. This is removed by holding the spot over a bowl of water to which a little ammonia has been added, and applying with a glass rod, or a small piece of wood, eighteen per cent, muriatic acid. The instant the stain disappears immerse the spot in the water thereby preventing the acid from affecting the texture of the cloth. Before using muriatic acid, it is best to test it on one corner of the fabric. Should you find that it changes the colors, then treat as for ink stains described above.

Mildew. Generally speaking mildew is not affected by chemicals, though it sometimes yields to their action. It may best be treated with a stiff paste made by boiling down Castile soap shavings, spreading a thick layer of this upon the stain and scattering over it some powdered potash. Moisten slightly with water and bleach out on the grass.

Javelle Water or Bleaching Compound. Javelle water for bleaching white goods is prepared as follows: place one pound of chloride of lime in an earthen jar having a tight cover and add four and a

half pints of water. Dissolve in a separate vessel twenty ounce of ordinary washing soda and pour into the first solution. When cold add two more pints of water, making eleven pints in all. Strain through muslin and allow it to settle and pour off the resulting clear liquid.

Candle Grease. Parafine or tallow is best removed with chloroform, though every housekeeper knows the old trick of ironing over a piece of blotting paper.

Grease and Oil. Grease and oil spots in wash goods may be removed with soap, ammonia, and water. For silks try first absorption, which is done by sprinkling the spot heavily with chalk or magnesia, placing a piece of blotting paper on both sides and ironing with a warm iron. Many a man who thinks he knows the best way to eradicate this most common of all stains finds that within a few weeks after treatment the garment has an unsightly ring where the spot was. This is due to the fact that when the stain was rubbed and the grease loosened, it, lacking an absorbent, spread itself into the surrounding fabric.

This is the right way to remove a grease spot. Take benzine, turpentine, gasoline, or best of all, ether, and moisten a large ring around the grease spot, gradually working towards the center; when this is reached immediately saturate two pieces of blotting paper with the spirit, place one beneath and the other above and press with a weight. By this means the grease will be absorbed as soon as dissolved. Care must be taken in the use of ether, gasoline, or benzine, not to bring it near a flame, as the vapors of all three are highly inflammable.

HARNESS AND LEATHER.

To Preserve Harness. First remove the dirt with a moist sponge. Do not use too much water, nor any soap. No harness gets so muddy that a moist sponge will not remove the dust, if cleaned while the mud is moist. Now give the leather a good coat of lampblack and castor or neat's-foot oil. Then with a good warm soap-suds sponge the harness thoroughly removing all the dirt. When the harness becomes dry, rub it over with a mixture of oil and tallow, equal parts, with which has been mixed lampblack or Prussian blue to give it color. Do not use more of this last compound of oil and tallow than is actually necessary, and rub it in thoroughly.

Leather Blacking. Take one ounce of copperas and one and one-half pints of water, and thoroughly mix. This is used by harness mak-

ers and shoemakers for blacking the edges of newly cut leather, or staining places that have become red or "foxy."

Water-proof Blacking. A blacking that will not injure the leather is most desirable. There is no ingredient in this blacking that is in any way destructive to the fibre.

1½ pounds Beeswax,	3 ounces Linseed Oil,
1½ ounces Prussian Blue,	6 ounces Ivory Black,
1 ounce Copal Varnish,	6 ounces Soft Soap,
1 pint Oil of Turpentine.	

Mix well together by gentle heating and keep the paste in old tin fruit cans.

Uncolored Leather. Russet lines, shoes, and uncolored leather may be nicely cleaned and made to look almost as good as new, by applying with a sponge a very weak solution of oxalic acid dissolved in water.

Old Harness Made Like New. Harness after long exposure to the air loses its luster and turns brown, and requires a new coat of blacking. This will not enter the grain, while there is any grease on the surface, and it must be removed by a careful washing in potash water. After drying apply a coating of the LEATHER BLACKING. Then apply a coating of oil to the surface to fasten the color and make the harness pliable.

BOOTS AND SHOES.

To Make Water-Proof. Melt together equal quantities of beeswax and mutton suet. While warm rub over the shoe or boot, soles as well as top.

To Soften. Leather that has hardened by water may be made soft and pliable by an application of kerosene oil. Neat's-foot oil, well rubbed in, is the best and most lasting for restoring softness and pliancy to leather, that has become hard.

Brilliant Liquid Blacking. A liquid blacking is easily applied and while not so often used on men's shoes, it is always the article applied to ladies' and children's shoes.

1 pound Ivory Black,
1 pint Molasses,
2 ounces Sweet Oil,
1 pint of each, Beer and Vinegar.

Rub together the first three, till the oil seems to have disappeared, then add the beer and vinegar.

Oil Paste Blacking. This is made of the same ingredients as the foregoing, only the quantity of beer and vinegar is reduced so that the result is a paste instead of a liquid.

CLEANING AND POLISHING.

To Clean Copper or Brass. The next time you think you have done with a lemon just dip it in salt and rub your copper kettle with it. You will be surprised to find what a brilliant surface you will obtain if you rub the article instantly with a dry soft cloth. You can polish all brass work by the same means, every stain disappearing as if by magic. If the brass is on furniture in the shape of knobs or ornaments use either powdered whiting or scraped rotten stone, mix with sweet oil and rub on with chamois skin.

Cleaning Brass. 1. Rub the surface of the metal with rotten stone and sweet oil, then rub off with a piece of cotton flannel and polish with soft leather.

2. A solution of oxalic acid rubbed over tarnished brass soon removes the tarnish, rendering the metal bright. The acid must be washed off with water, and the brass rubbed with whitening and soft leather.

3. A mixture of muriatic acid and alum dissolved in water, imparts a golden color to brass articles that are steeped in it for a few seconds.

4. Put together two ounces sulphuric acid, an ounce and a half nitric acid, one dram saltpetre and two ounces rain water. Let stand for a few hours, and apply by passing the article in and out quickly, and then washing off thoroughly with clean rain water. Old discolored brass chains treated in this way will look equally as well as when new.

Silver, Keeping Bright and Clean. To clean silver never use a particle of soap on your silver-ware, as it dulls the lustre, giving the article more the appearance of pewter than silver. When it wants cleaning rub it with a piece of soft leather and the following mixtures:

- $\frac{1}{2}$ pound prepared Chalk or Whiting,
- $\frac{1}{4}$ ounce Gum Camphor.
- 1 ounce each of Aqua Ammonia and Alcohol.
- 3 ounces Benzine.

Mix well together, and apply with a soft sponge, and allow it to dry before polishing.

To Keep Bright. For the preservation of the lustre of articles of silver or plated ware, when not needed for actual use for a considerable

time, a coating of collodion (to be had at the drug stores), may be employed to great advantage. The articles are to be heated, and the collodion then carefully applied by means of a brush, so as to cover the surface thoroughly and uniformly. It is used most conveniently when diluted with alcohol, as for photographic purposes. Articles thus prepared exhibit no trace whatever of their covering, and have stood for more than a year in shop windows and in dwellings, retaining their white lustre and color, while other pieces not thus prepared became seriously tarnished.

To Clean Silver. One of the largest britannia firms in New England recommends the following to clean silver.

$\frac{1}{2}$ pound Sal-soda,
8 quarts Water.

When at a boiling heat dip the pieces of silver, and immediately wash in soap suds, and wipe dry with a piece of cotton flannel.

Silver Polish. There is no better silver polish than the old fashioned Spanish Whiting, when moistened and applied with a soft flannel and a silver brush. When dry, rub with a chamois and dry whiting.

To Keep the Stove Bright. Mix the stove blacking with vinegar to the consistency of cream, add pinch of sugar, put on with a brush, and polish with old newspapers. It will give a beautiful and lasting polish.

To Clean Marble. To clean marble, take two parts of common soda, one part of pumice stone, and one part of finely powdered chalk; sift it through a fine sieve and mix with water; then rub it well over the marble, and the stains will be removed; finally, rub the marble over with salt and water.

To Clean Willow Ware. To clean willow furniture which is not varnished, use salt and water. Apply it with a stiff brush, scrub well and dry thoroughly.

To Whiten Ivory. Rub with finely powdered pumice-stone and water, and expose to the sun while still moist, placing over it a glass shade to prevent cracking. Repeat the treatment until the proper hue is produced. Keeping a piano open on fine days so the sun's rays will fall directly on the keys, will keep the latter from turning yellow.

To Clean Steel. Mix emery powder with linseed oil and form a paste; rub it on with a piece of flannel. Do not let it remain on but at once rub off with emery powder till the steel is bright. Polish with

a leather. If rusty, clean first with fine sand paper, and then apply the emery as instructed.

To Clean Glass. First wash well with a soft sponge, using clear water and squeezing the sponge as dry as possible. Then dip the damp sponge in whiting and rub over the surface of the glass. When dry rub clean with a soft cloth.

PASTE, GLUE, AND MUCILAGE.

Paste, That Will Keep. Dissolve a teaspoonful of alum in a quart of warm water. When cold, stir in as much flour as will give it the consistency of thick cream, being particular to beat up all the lumps; stir in as much powdered resin as will stand on a dime, and throw in half-a-dozen cloves to give a pleasant odor. Have on the fire a teacupful of boiling water; pour the flour mixture into it, stirring well all the time. In a very few minutes it will be of the consistency of mush. Pour it into jars and when wanted for use it can be readily thinned with water.

Liquid Glue. First soak in cold water all the glue you wish to make at one time, using only glass, earthen, or porcelain dishes; then by gentle heat dissolve the glue in the same water, and pour in a little nitric acid, sufficient to give the glue a sour taste, like vinegar, or one ounce to each pound of glue.

Water-Proof Glue. One ounce of gum sandarac and one ounce of mastic are to be dissolved together in a pint of alcohol, to which one ounce of white turpentine is to be added. At the same time a very thick glue is to be kept ready, mixed with a little isinglass. The solution of the resins in alcohol is to be heated to boiling in a glue pot, and the glue added gradually with constant stirring, so as to tender the whole mass homogeneous. After the solution is strained through a cloth, it is ready for use, and is to be applied hot. It dries quickly and becomes very hard, and surfaces of wood united by it do not separate when immersed in water.

Glue as Mucilage. Take of isinglass and parchment size, each one ounce, sugar candy and gum tragacanth, each two drams; add to them one ounce water, and boil the whole together till the solution appears (when cold) of the consistency of glue; then pour it into any form you please. If this glue be wet with the tongue, and rubbed on the edges of paper, silk or leather that are to be cemented, they will, being

laid together, pressed slightly, and suffered to dry, be as firmly united as other parts of the substance.

Elastic Glue. If glue or gelatine is incorporated with about one-quarter of its weight of glycerine, it loses its brittleness, and becomes useful for many purposes for which it is otherwise unfit, such as dressing leather, giving elasticity to parchment or enameled paper, and for book-binding.

Mucilage. 1. Put three ounces of gum arabic in an earthenware vessel containing half a pint of cold water. If the liquid is occasionally stirred, the gum in twenty-four hours will be dissolved and the mixture ready for use. Cloves will keep it from moulding.

2. Fine clean glue, one pound; gum arabic, ten ounces; water, one quart; melt by heat in a glue kettle or water-bath; when entirely melted, add slowly ten ounces strong nitric acid, and set off to cool. Then bottle, adding a couple of cloves to each bottle.

WAGON TIRES AND FENCE POSTS.

Wagon Tires Kept From Loosening. If this plan is carefully followed, tires on wagons will not get loose and require resetting. Use a tin-pan long and narrow, and deep and fill with oil, setting it on an oil stove. Let the oil come to a boiling heat, and then placing the stove and pan near a post or studding, hang the wheel on a peg put in the post or studding, so that the felloe of the wheel will run in the oil. Thoroughly soak each felloe an hour. The timber should be dry, as green timber will not take oil. Care should be taken that the oil is not made hotter than a boiling heat or the timber will be burned. Timber filled with oil is not susceptible of injury by water, and is rendered much more durable by this process.

Fence Posts. Any sort of timber, when employed for fence-posts will be more than twice as durable if allowed to become well seasoned before being set in the ground. The durability of seasoned posts may be promoted, so as to make them last for an age, by the application of a heavy coat of coal-tar to the portion buried in the earth, and a few inches above the surface of the tar. The ground-end may be put in hot tar and let boil for fifteen minutes. When cool, cover with coal-tar thickened with ground slate or ground brick. The boiling causes the pores to absorb tar. The coating prevents the action of moisture. But such a treatment of green posts would do but very little good and perhaps mischief. The better way is to season the post well before setting

it, and when the post-hole is filled to within ten inches of the surface of the ground, to apply a heavy coat of tar and fill up with earth. As fence-posts always decay near the surface of the ground, it is only necessary to protect the post a few inches above the surface, and about a foot below it. The timber begins to decay, usually on the surface of the posts. Therefore, if the surface can be protected by some antiseptic material, posts will last a lifetime.

ANNOYING INSECTS.

Exterminating Insects. By scattering chloride of lime on a plank in a stable, biting flies are driven away. Sprinkling beds of vegetables with a weak solution of this salt effectually preserves them from caterpillars, slugs, etc. It has the same effect when sprinkled on fruit-trees and shrubbery. Mixed in a paste with fatty matter, and applied in a narrow band around the trees, it prevents insects from creeping up.

Another plan is to carry all the toads you can find to your gardens. They will devour immense number of bugs. A toad will swallow the largest specimen of the tomato worm, though sometimes he will have a hard time of it.

Hens, wasps, and spiders are all devourers of your enemies. A common duck will go up and down rows of tomato and potato vines, and pick off the large worms usually found on such vines, as fast it can see them; and they will see a half dozen when a man could not see one. Young turkeys will do the same service, though they are not so easily controlled and guided.

All fallen fruit is to be picked up once or twice a day, and boiled, and then given to your cattle to be devoured. By doing this it will pay ten times over, and the result of it will be that the next year you will not have insects.

To Exterminate Bed Bugs. There are various remedies for getting rid of these annoying insects. The following are the most reliable.

1. Put a few drops of oil of cinnamon into naphtha and anoint the openings and cracks. Do not take near fire or burning lamp.

2. Two ounces red arsenic, one-quarter pound of white soap, one-half ounce of camphor dissolved in a teaspoonful of alcohol, made into a paste of the consistency of cream. Use to anoint the bedstead.

To Destroy the Striped Bug. The striped bug on cucumbers and melons may be destroyed as follows:

1. By a strong solution of hen-house manure—say one peck of the manure to one and a half gallons of water; let it stand twenty-four hours and sprinkle the plants freely with it after sunset.

2. By sifting charcoal dust over the plants; if repeated three or four times the plants will be entirely freed from the annoyance.

3. Plant a few kernels of buckwheat in each hill of cucumbers or melons, and striped bugs will not trouble the vines.

Roach Exterminator. Borax is one of the best roach exterminators. There is something either in the odor or touch of borax which is certain death to them. Purchase it pulverized and sprinkle around the infested places.

Red Ants. Sprinkle oil of pennyroyal on the pantry shelves and the ants will disappear.

Flies on Horses. As a preventive of horses being teased by flies, take two or three small handfuls of walnut leaves, upon which pour two or three quarts of cold water; let it infuse for one night, and pour the whole next morning into a kettle, and let it boil for fifteen minutes. When it becomes cold it will be fit for use. No more is required than to moisten a sponge, and, before the horse goes out of the stable, let those parts which are most irritable be smeared over with the liquor—namely, between and upon the ears, the neck, the flanks, etc. Not only the lady or gentleman who rides out for pleasure will derive pleasure from the walnut leaves thus prepared, but the coachman, the wagoner, and all others who use horses during the summer.

To Keep out Mosquitoes. 1. Oil of pennyroyal scattered about in small quantities. This is best sprayed about the room with a perfume atomizer.

2. Take of gum camphor a piece about one-third the size of an egg, and evaporate it by placing it in a tin vessel, and holding it over a lamp or candle, taking care that it does not ignite. The fumes will soon fill the room and expel the mosquitoes.

3. Carbolic acid has recently been successfully used for the extermination of mosquitoes and flies. A small piece of cloth saturated with the acid, was hung in the room, and in two hours the flies had entirely disappeared. In the evening the acid was tried in the kitchen where the mosquitoes were very troublesome, and there it met with the same success.

To Prevent Mosquito Biting. 1. Dilute a little of the oil of thyme with sweet oil, and dip pieces of paper in it. Hang in your room or rub a little on the hands and face when going to bed.

2. Petroleum is a good mosquito bar, if used in this way; a little coal oil is dropped on some raw cotton, the excess of it squeezed out, and the cotton then rubbed over the face and hands. The little pests will not come near. The remedy seems nearly as bad as the disease; to those who do not mind the smell of kerosene it will be found to be very useful.

To Cure Mosquito Bites. 1. Apply sweet spirits of nitre to mosquito bites and it will draw out all the soreness and itching, if the skin is not broken by scratching it.

2. Apply at once a few drops of aqua ammonia, or an infusion of tobacco, either of which will allay the itching and soreness almost immediately.

3. Carbolic acid has also been tried, and with good success, but it should be diluted, to prevent producing a blister.

Bee and Wasp Stings. 1. These stings though very painful are not dangerous to a healthy person, unless in the mouth, throat, or eyelid. The sting of a bee being barbed at the end, it is always left in the wound, and should when possible, be carefully removed. That of a wasp is pointed only, so that they can sting more than once, which a bee cannot do. If, after the sting of the bee is extracted, the wound be sucked, very little inflammation will follow; and if spirits of ammonia be then applied, a prompt healing will result.

2. Common whiting, moistened with water, and applied immediately, and in a few minutes washed off, will prevent pain and swelling from following the sting of a bee or wasp.

3. The slice of a common onion rubbed on the sting of a wasp, or, if in the throat, chewed slowly and the piece swallowed, will result in a certain cure.

The Bites of Bees, Wasps, Hornets, scorpions, etc., may be instantly relieved by the immediate and free application of spirits of hartshorn as a wash to the part bitten. The part may afterwards be covered with a little sweet oil.

Harvest Bug. The best remedy is benzine, which immediately kills the insect. A drop of tincture of iodine has the same effect. Many sufferers prevent the attacks by sprinkling a little benzine over the stockings before walking.

To Destroy Cockroaches. 1. Strew the roots of black hellebore at night, in the places infested by these vermin, and they will be found in the morning dead or dying. Black hellebore grows in marshy ground, where it may easily be gathered, or it may be purchased at any drug store.

2. Take pulverized borax, four ounces; flour, one ounce; mix intimately and distribute the mixture in cupboards which are frequented by the roaches, or blow it by means of a bellows, into the holes or cracks that are infested by them.

3. Take carbolic acid and powdered camphor in equal parts; put them in a bottle; they will become fluid. With a painter's brush of the size called a sash-tool, put the mixture on the cracks or places where the roaches hide; they will come out at once. Then kill.

Fleas on Dogs and Cats. Fleas are usually brought into the family circles by pet dogs and cats. The oil of pennyroyal will drive these insects off; but a cheaper method, where the herb flourishes, is to throw your cats and dogs into a strong tea made by steeping the pennyroyal in water. When the herb cannot be got, the oil can be procured. In this case, saturate strings with it and tie them round the necks of dogs and cats. These applications should be repeated every twelve or fifteen days.

To Kill Caterpillars. Boil together equal quantities of rue, wormwood, and tobacco, in common water. The liquid should be very strong. Sprinkle it on the leaves and young branches every morning and evening during the time the fruit is ripening.

To Kill Crickets. A little ginger and water placed in a dish before the fire will attract the crickets, and on partaking of the liquor they will die. The best mode of destroying the insects in their nest is to put snuff into the chinks of the grate.

Moths in Clothing and Furs. Either one of the following methods will keep out the moths provided the clothes are put away without any eggs being on them. Put in boxes and PASTE PAPER ALL AROUND THE COVER, making it impossible for them to get in.

1. Sprinkle allspice berries among the clothes.
2. Sprinkle the clothes with the seeds of the musk plant.
3. Procure shavings of camphor-wood, and enclose in bags.
4. Procure shavings of cedar-wood, and enclose in muslin bags, which should be distributed among the clothes.
5. An ounce of gum camphor and one of the powdered shell of red

pepper are macerated in eight ounces of strong alcohol for several days, then strained. With this tincture the furs or clothes are sprinkled over and rolled up in sheets.

6. Carefully shake and brush woolens in the spring, so as to be certain that no eggs are in them; then sew them up in cotton or linen wrappers, putting a piece of camphor gum, tied up in a bit of muslin, into each bundle, or into the chests and closets where the articles are to lie. No moth will approach while the smell of camphor continues. When the gum is evaporated it must be renewed. Enclose them in a moth-proof box with camphor. Furs or woolens put away in spring time, before moth eggs are laid, into boxes, trunks, or closets even, where moths cannot enter, will be safe from the ravages of mothworms, provided none were in them that were laid late in the autumn, for they are not of spontaneous production.

Flies, Their Habits and Kinds. Flies are scavengers and eat not only the sweet things and fresh blood, but also things unclean, especially decaying animal substances. With their proboscis, sucking up the juices which by evaporation would contaminate the air, they are very useful indeed, in the houses of slovenly housekeepers.

The blue-bottle, or blow-fly, deposits its eggs on animal substances, which are recognized as fly-blows. In a warm temperature they hatch in three or four hours after they are laid, and then are called larvæ or maggots. The maggots from three flies will consume a dead horse almost as quickly as a lion. So voracious are they that they increase in weight about two hundred times in twenty-four hours.

The flesh-fly, a little longer than the blow-fly, drops living maggots on dead fish, the maggots being hatched within the fly.

The cheese-fly is very small; of a shining black color, with transparent wings and yellow hind legs. It deposits about two hundred or two hundred and fifty eggs into the cracks in cheese, which are developed into skippers.

The maggots of some species of flies spin cocoons; with others, the skin simply hardens and incases the pupa, or chrysalis. At length the fully developed fly makes its escape by forcing off with its head the chrysalis case.

The different-sized flies, are different varieties, and not young and old, as some suppose; for flies never grow to any very perceptible extent. A large poportion of the swarms of flies hatched during the warm weather of summer are destroyed by the frosts of winter. Only a few that are so

fortunate as to find shelter and warm places escape; and in similar situations, some of them pass the winter in chrysalis state, and only hatch out when warm weather returns. The house-fly is a domestic insect, and is said never to be found except in the vicinity of man's present or recent home.

To Destroy Flies. House flies are present just in proportion to the dirt and uncleanness there is in a house. The cleaner the house and surroundings, the fewer flies there will be. Try any of the remedies here suggested and be rewarded by a decrease of these annoying pests.

1. They may be effectually destroyed by putting half a spoonful of black pepper in powder on a tea-spoonful of brown suar, and one tea-spoonful of cream; mix them well together and place them in a room where the flies are troublesome, and they will soon disappear.

2. Laurel oil, freely used, the smell of which, although a little strong, is not very offensive, drives away flies; and they dare not come near the walls or the wainscoats which have been rubbed with it.

3. Flies usually propagate in stables and they can be kept away so as to prevent annoyance to the animals or further propagation by scattering sawdust about in the stables which is saturated with dilute carbolic acid (one part acid to one hundred parts water). A similar application to the kitchen floor will keep them away.

Sticky Ply Paper. Melt resin in any vessel over the fire, and while soft add to it enough sweet oil to make it as thick as molasses. Spread upon writing paper with a brush and it will not dry in a long time and is so sticky as to hold fast the legs of any insect attracted to it, or accidentally coming in contact. It may be placed about the house, the pantry or elsewhere, and will soon attract and hold fast ants and other insects. It is also used on table legs, the edges of shelves and other places to prevent the ascent of ants. Strips of this paper fastened closely about the trunks of trees, plants, etc., the varnish side out, prevents the ascent of insects. It possesses the great advantage over the ordinary fly papers in that it is not poisonous.

4. Put about a quart of water sweetened with molasses in a tin wash basin or smooth glazed china bowls. Set it at evening in a place frequented by the bugs. Around the basin put an old piece of carpet that the bugs may have easy access to the top. They will go down in the water, and can not get out.

5. Mix up a quantity of fresh burned plaster of paris (gypsum, such as is used for making molds and ornaments), with wheat flour and a

little sugar, and distribute on shallow plates and box boards, and place in the corners of the kitchen and pantry, where they frequent. In the darkness they will feast themselves on it. After three or four nights renewal of the preparation, no cockroaches will be found on the premises.

Moths in Carpets. Wring a coarse towel out of clear water, spread it smoothly on the carpet, iron it dry with a good hot iron, repeating the operation on all parts of the carpet suspected of being infested with moths. No need to press hard, and neither the pile nor color of the carpet will be injured, and the moths will be destroyed by the heat and steam.

RATS AND MICE.

To Kill or Drive Away Rats. 1. Mix some fine plaster of Paris with an equal quantity of flour; put the mixture in the place infested by the vermin, and a vessel full of water beside it. The rats will devour the mixture and then drink; whereupon the plaster, brought in contact with the water, will become solid, and like a stone in their stomachs, and will cause their death. This method is evidently highly preferable to the use of arsenic, which is always attended with danger.

2. Mix up the following and put on bread or cheese :

3 ounces Sugar.
1 pound Flour,
8 ounces Sulphur.
8 ounces Phosphorus.

3. When a house is infested by rats which refuse to nibble at toasted cheese, and the usual baits, a few drops of the highly scented oil of rhodium, poured on the bottom of a cage top, will always attract before morning. Where a trap baited with all manner of edibles had failed to attract a single rat, the oil of rhodium caused it to be completely crowded night after night.

4. Mix powdered nux vomica with oatmeal, and lay it in their haunts, observing proper caution to prevent accidents.

5. (PHOSPHORUS PASTE.) Take of phosphorus one part, liquify it in twenty parts of luke-warm water, pour the whole into a mortar, and add immediately twenty parts of rye meal; when cold, mix twenty parts of butter melted, and fifteen parts of sugar. If the phosphorus is in a finely-divided state, the ingredients may be all mixed at once, without

melting them. This mixture will retain its efficacy for many years, for the phosphorus is preserved by the butter and only becomes oxydized on the surface. Rats and mice eat this mixture with avidity, after which they swell out and soon die.

6. Cover the floor near their holes, with a thin layer of moist caustic potash. When the rats walk on this it makes their feet sore. These they lick with their tongues, which makes their mouths sore, and the result is that they not only shun this locality, but appear to tell all the neighboring rats about it, and eventually the house is entirely abandoned by them, notwithstanding that the neighborhood may be teeming with them.

7. Corks, cut as thin as wafers, roasted or stewed in grease, and placed in their tracks; or dried sponge in small pieces, fried or dipped in honey, with a little oil of rhodium, or bird-lime, laid in their haunts, will stick to their fur and cause their departure. If a live rat be caught, and well rubbed over with tar, and oil, and afterward let escape in the holes of others, they will disappear.

8. Cover a common barrel with stiff, stout papers, tying the edge around the barrel; place a board so that the rats may have an easy access to the top; sprinkle cheese parings or other "feed" for the rats on the paper for several days, until they begin to believe they have a right to the food. Then place a cover balanced near the centre and the rat will fall into the barrel. Have water in the bottom which covers a stone all but place enough for one rat. Then the second rat gets in the barrel, there will be a fight for a place on the stone, and this noise will call other rats to the barrel. Each time a rat gets on the head it will add one rat to the number inside.

Mice. These are disposed of in about the same manner as rats. Gather spearmint, peppermint, or any other kind of mint, and scatter it about their holes, and they will forsake the premises.

PRESERVING AND SALTING MEAT.

To Cure Hams. For each twelve pounds of ham use the following:

- 2 pounds Common Salt,
- 2 ounces Saltpetre,
- $\frac{1}{4}$ pound Bay Salt,
- $\frac{1}{4}$ pound Brown Sugar.

Reduce the solids to the finest powder. Rub the hams well with it.

Then place them in a deep pan, and add a wine-glassful of good vinegar. Turn the hams every day; for the first three or four days rub them well with the brine; after that time it will suffice to ladle it over the meat with a wooden or iron spoon. They should remain three weeks in the pickle. When taken from it wipe them well, put them in bags of brown paper and then smoke them with wood smoke for three weeks. Most grocers, dealers in hams, and others, who are particular with their meat, usually take the precaution to case each one, after it is smoked, in canvass, for the purpose of defending it from the attacks of the little fly, (*dermestes lardarius*), which by laying its eggs in it, soon fills it with its maggots. This troublesome and expensive process may be altogether superseded by the use of pyroligneous acid. With a painter's brush, dipped in the liquid, one man, in the course of a day, may effectually secure two hundred hams from all danger. Care should be taken to insinuate the liquid into all the cracks, etc., of the under surface. This method is especially adapted to the preservation of hams in hot climates.

2. Make the following pickle and let the meat lay in it six weeks:

2½ pounds Sugar,
7 pounds Coarse Salt,
2 ounces Saltpetre,
4 gallons Water.

Boil together and put to cool. The above is sufficient for one hundred pounds of meat.

3. To a cask holding, say from twenty-five to thirty hams, after packing them closely and sprinkling them slightly with salt, let them lie thus for three days; then make a brine sufficient to cover them, by putting salt in clear water, making it strong enough to bear up a sound egg or potato. Then add one-half pound of saltpetre, and a gallon of molasses; let them lie in brine for five weeks. Then take them up and let them drain; then while damp, rub the flesh side and the end of the leg with finely pulverized black, red, or cayenne pepper; let it be as fine as dust, and dust every part of the flesh side, then hang them up and smoke. You may leave them hanging in the smoke house or other cool place where the rats cannot reach them as they are perfectly safe from all insects.

To Keep Smoked Hams. Make sacks of coarse cotton cloth, large enough to hold one ham, and fill with chopped hay all around about two inches thick. The hay prevents the grease from coming in contact with the cloth and keeps all insects from the meat. Hang in

the smokehouse, or other dry, cool, place, and they will keep a long time.

To Pickle Mutton Hams for Drying. First take weak brine and put the hams into it for two days, then pour off and apply the following, and then let it remain on from two to three weeks according to size: for each one hundred pounds, take salt six pounds; saltpetre, one ounce; saleratus, two ounces; molasses, one pint; water, six gallons; will cover these if closely packed.

Corned Beef. 1. Cut up the beef, and weigh and bulk it up, sprinkling a little salt over it, and let it lay ten or twelve hours, then pack it down in the barrel. To one hundred pounds of beef take one quart of salt, three and one half pints of molasses, one table-spoonful of saltpetre. Put all this into sufficient water to cover the beef; boil the pickle, and skim off all the scum, and when cold pour it over the beef, and weigh it down. Keep the beef covered with the pickle.

2. Rub each piece of beef very lightly with salt; let them lie singly on a tray or board for twenty-four hours, then wipe them very dry. Pack them closely in a tub, taking care that it is perfectly sweet and clean. Have the pickle ready, made thus: boil four gallons of soft water with ten pounds of coarse salt, four ounces of saltpetre, and two pounds of coarse brown sugar; let it boil fifteen minutes, and skim it while boiling very clean. When perfectly cold pour it on the beef, laying a weight on the top to keep the meat under the pickle. This quantity is sufficient for one hundred pounds of beef if closely packed.

Dried Beef. The good qualities of dried beef as an article of food for the family are not fully appreciated. In point of excellence it is one of the nicest articles, when properly prepared, that we have in our store-room. It is also one of the most economical articles of food; quite a small quantity of dried beef, shaved very fine, and cooked with a nice gravy, will serve for meat for a family at a very small expense. It is so convenient to have; always ready; always acceptable. To people who live convenient to market, it is not of so much importance; but to those, who live at a distance from towns, dried beef is one of the necessary articles in our bill of fare.

There are several methods of cooking it. Some prefer it cooked with a gravy of water, seasoned with butter, thickened with flour, and perhaps eggs broken in while cooking. Others cook it with crumbs of sausage, frying the sausage first, then adding the beef with water, and thickening with flour. It is also very good cooked with a little sweet

milk and sweet cream, the gravy being thickened with flour; allow it to boil once; that is all the cooking it requires. A dish of dried beef, properly cooked, served with toast, baked potatoes, and boiled eggs, is a very nice provision for breakfast or a dinner prepared in haste. When too salt, it can be remedied by soaking, after cutting and before, and adding a little white sugar while cooking, to restore the sweetness lost by soaking. Sugar cured beef is much nicer than that cured with salt alone.

To Cure Bacon. The reputation of the Hampshire bacon is owing entirely to the care with which it is cured. The hogs, which are fattened on peas and barley meal, are kept fasting for twenty-four hours at least before they are killed; they are used as gently as possible in the act of killing, which is done by inserting a long-pointed knife into the main artery which comes from the heart. The hair is burned off with lighted straw, and the dirty surface of the skin scraped off. The carcass is hung up after the entrails have been removed, and the next day, when the meat has become quite cold, it is cut up into flitches. The spare-ribs are taken out, and the bloody veins carefully removed; the whole is then covered with salt, with a small quantity of saltpetre mixed with it. Sometimes a little brown sugar is added, which gives a pleasant sweetness to the bacon. The flitches are laid on a low wooden table, which has a small raised border at the lower end. The table slants a little, so as to let the brine run off into a vessel placed under it, by a small opening in the border at the lower end.

The flitches are turned up and salted every day; those which were uppermost are put under, and in three weeks they are ready to be hung up to dry. Smoking the bacon is no longer as common as it used to be, as simply drying in the salt is found sufficient to make it keep. Those who from early association like the flavor given by the smoke of wood, burn sawdust and shavings in a smothered fire for some time under the flitches.

When they are quite dry they are placed on a board rack for the use of the family, or are packed with chaff into chests till they are sold.

To Keep Butter Sweet. To every twenty pounds of butter take three pounds salt, one pound loaf sugar, one-quarter pound pulverized saltpetre; mix and put a layer of butter about eight inches thick; then sprinkle on a light covering alternately, until your cask is full. Pack in air-tight casks. Butter packed in this way will keep sweet for two or three years.

FRUIT AND VEGETABLES KEPT OVER WINTER.

To Keep Grapes. 1. They must not be too ripe. Take off the imperfect grapes from the bunches. On the bottom of a keg put a layer of bran that has been well dried in an oven, or in the sun. On the bran put a layer of grapes, with bran between the bunches so that they may not be in contact. Proceed in the same way with alternate layers of grapes and bran, till the keg is full; then close the keg so that no air can enter.

2. In a box first lay a paper, then a layer of grapes, selecting the best bunches and removing all imperfect grapes, then another paper, then more grapes, and so until the box is full; then cover all with several folds of paper or cloth. Nail on the lid, and set in a cool room where it will not freeze. Use small boxes, so as not to disturb more than enough to use in a week or so. Give each bunch plenty of room so they will not crowd, and don't use newspapers. Some seal the stem with sealing wax and wrap each bunch by itself, but it is not necessary to go to that trouble. The grapes should be looked to several times during the winter. Should any mould or decay, they should be removed and the good ones again repacked.

3. Cut a piece out of a ripe pumpkin or gourd, making an aperture large enough to admit the hand. Clean out the interior of seeds and place the ripe grapes inside, and replace the cover and press it in firmly. Keep the pumpkins in a cool place—and the grapes will be found to retain their freshness for a long time. A very careful selection must be made of the pumpkin, but the common field pumpkin, however, is well adapted for the purpose in question.

To Keep Cabbage. Sink a barrel in the ground to within an inch or two of the top, cut off the heads and fill the barrel full, put on a board to keep out water, and that is all the covering that is needed.

To Keep Apples. 1. Select the best of fruit, and carefully wrap each specimen separately in paper so that the air cannot pass through, and the time of keeping in a sound and eatable condition can be greatly prolonged. After covering each apple with paper, select a light wooden box and cover it on the inside, or outside, with paper either before or after putting in the fruit, as the case may be. Those persons who are desirous of preserving a small quantity of apples will be amply repaid for their trouble by trying the above experiment. The fruit should not be

disturbed after packing until the box is opened at the time the fruit is to be eaten.

2. Sprinkle a layer of dry sawdust at the bottom of a box, and then place a layer of apples in it, so that they will not touch each other. Upon these place a little layer of sawdust, and so on until the box is filled. The boxes, after being packed in this way, are to be placed on the wall in the cellar, up from the ground, where they will keep, perfectly retaining their freshness and flavor until brought out.

3. Apples for keeping should be laid out on a dry floor for three weeks. They then may be packed away in layers, with dry straw between them. Each apple should be rubbed with a dry cloth as it is put away. They should be kept in a cool place, but should be sufficiently covered with straw to protect them from frost. They should be picked on a dry day. They also keep if packed in dry sand.

4. An excellent method for preserving apples through the winter is to put them in barrels or boxes, surrounding each apple with some dry mould or gypsum (plaster of Paris)—not the calcined used for casts, models, etc.,—and keep in a dry, cool outhouse.

To Keep Celery. This may be kept in good condition during the winter in a cool, dry cellar, by having it set out in earth. When a small quantity only is wanted, take a box and stand the celery up in it, placing a little earth about the roots. The farmers who raise quantities of it often keep it in their old hot-beds, standing up, and protecting it from frost. There is no vegetable more relished than this, and every person who has a garden should raise enough for his own use, if no more.

To Keep Potatoes from Sprouting. To keep potatoes intended for the use of the table from sprouting until new potatoes grow, take boiling water, pour into a tub, turn in as many potatoes as the water will entirely cover, then pour off all the water, handle the potatoes carefully, laying up in a dry place on boards, only one layer deep, and see if you do not have good potatoes the year round, without hard strings and watery ends caused by growing.

Pears Kept Fresh. After they have been allowed to lay on the shelves in the fruit-room, and sweat, they should be wiped dry, and packed in boxes with dry sawdust enough to exclude the air from them. If they were packed in dry sand, they would keep equally as well and perhaps better; but the objection is that it is difficult to clean them from sand, and they eat gritty when so kept.

TO PRESERVE OR PICKLE EGGS.

To Keep Eggs Without Spoiling. For each twelve quarts of water put in one pint of fresh slaked lime, and one pint of common salt, mix well, fill a barrel about half full of this fluid, then with a dish, let the fresh eggs down into this, and they will settle right side up with care every time, and they will keep any reasonable length of time without any further care than to keep them covered with the fluid. Eggs may be laid down in this way any time after June.

2. Dip them into a solution of gun-cotton, (collodion), so as to exclude the air from the pores of the shells, or the collodion may be applied with a brush.

3. Keep them at the temperature of 40° F. or less in a refrigerator. Specimens have been exhibited, which were fourteen months old, and still perfectly fresh and sweet.

4. Pack the eggs in a cask with the smaller end downward, and fill the cask with melted tallow. This method is practiced very extensively in Russia and in other parts of Europe, and is generally successful.

5. Apply with a brush a solution of gum arabic to the shells, or immerse the eggs therein; let them dry, and afterwards pack them in dry charcoal dust. This prevents their being affected by any alterations of temperature.

6. Eggs may be preserved by keeping them buried in salt, or dipping them during two or three minutes in boiling water. The white of the eggs then forms a kind of membrane, which envelops the interior, and defends it from the air.

7. Take of quick-lime one pound; salt, one pound; saltpetre, three ounces; water, one gallon. It is necessary that the solution be boiled ten or fifteen minutes, and when cold put in the eggs, small end downward, using a vessel lined with lead, and placing in a cold but dry cellar.

8. Get a good sweet wooden box, put about an inch of salt on the bottom; take sweet grease of any kind, lard or drippings, rub the eggs all over with it and put them, the little end down, in the salt; then spread a layer of salt and then add more eggs.

9. Dissolve gum shellac in alcohol, when the mixture may be applied with a common paint brush. When dry, pack in bran, points downward. Eggs so preserved will keep a long time. When about to be used, the varnish may be washed off.

10. A Parisian paper recommends the following method for the preservation of eggs: dissolve four ounces of beeswax in eight ounces of warm olive oil; in this put the tip of the finger and annoint the egg all around. The oil will immediately be absorbed, and the shell and pores filled up by the wax. If kept in a cool place the eggs after two years, will be as good as if fresh laid.

11. An old sea captain says: "The week before going to sea, on a four months' voyage, I gathered in sixty dozens of eggs for cabin sea-stores, taking special pains to prove every egg of the lot a good one; besides, I bought them of my farmer friends, and know they were all fresh. Then I fixed them for keeping, by taking five or six dozens at a time in a basket, and dipping them about five seconds in the cook's "copper" of boiling water. After scalding, I passed the eggs through a bath, made by dissolving about five pounds of the cheapest brown sugar in a gallon of water, and laid them out on the galley floor to dry. There I had my sixty dozens of eggs sugar-coated. I packed them in charcoal dust instead of salt; I tried salt ten years, and I don't believe it preserves eggs a mite. The steward had strict orders to report every bad egg he should find. During the voyage he brought three, not absolutely spoiled, but a little old. All the others, or what was left of them, were as fresh as when we came in as they were when I packed them away."

SOAP AND SOAP MAKING.

How to Make Soap. Animal fat, such as tallow, is the substance most at hand of all fatty matter for soap-making, although vegetable oils, such as castor, sunflower, olive and other oils, and also resin, are used in soap making occasionally, but tallow being more easily obtainable, and generally at a lower cost than any of the oils above enumerated, is most extensively employed in the manufacture of domestic soap.

For this purpose the grease after being freed of skin, by boiling, straining, and remelting, is heated to the temperature of boiling water, and mixed on the fire with a hot solution of either soda, potash, or both, in water called the lye; the whole is gradually transferred into an iron pot, larger by at least one third than the whole mixture, about one quart of the melted fat being first ladled into it, then as much or more of the hot lye, the mixture constantly stirred on the fire till a sort of creamy matter is formed, the ladling kept on alternately till all the fat

and lye are mixed together; the stirring to be kept up till the mixture boils, some ten or fifteen minutes, according to the strength of the lye employed.

Then transfer from the boiler into a form, a tight box, in which muslin has been placed overhanging the box, so that the soap may be afterward more easily drawn out of it for the purpose of drying, or it may be poured in a common wash-tub, previously soaked in water to prevent adhesion to the tub, and there allowed to harden for a few days, from which it is put upon a table, to dry and be cut in bars for use, by means of a wire.

To Preserve Soap Grease. Boil all the scraps, rinds, and bones in a weak lye, and the purer grease in clear water. Let the mixture cool, take off the cake of grease, and strain it. It is well to do this occasionally, as you save it; for when kept a long time, impure grease becomes offensive. You must be careful to dry off all the water before laying it away in your grease tub, if you wish it to keep sweet.

To Purify Soap Grease. If the grease is very foul in smell, it should be put in a boiler with water, on the fire (about three times as much water as of the grease), and add a tea-spoonful of permanganate of potash to each ten pounds of grease, stirring well, and after the mixture has cooled a little it is strained through a cloth, and allowed to rest, when the cake of fat is taken out and put in a cool place, or in the pot in which it is to be remelted for transformation into soap. The purpose of the permanganate of potash is to remove the rank odor of the grease, which otherwise would be found in the soap.

Soft Soap. 1. Take one gallon of soft soap, to which add one gill of common salt, and boil an hour. When cold, separate the lye from the crude. Add to the crude two pounds of sal-soda, and boil in two gallons soft water till dissolved. If you wish it better, slice two pounds of common bar soap, and dissolve in the above. If the soft soap makes more than three pounds of crude, add in proportion to the sal-soda and water.

2. For one barrel take potash, eight pounds; melted and clarified fat, eight pounds. Crack the potash in small lumps, and put it into a large iron pot of three or four gallons capacity, with hot boiling water to nearly fill it. Heat the fat in another iron pot quite hot. Put three or four gallons of hot water in the barrel, previously cleaned and ready for use, and ladle in it alternately the hot fat and hot lye; stir the whole briskly for a while before more lye and fat are ladled in, and gradually

add enough hot water to fill the barrel; stir again the whole, after each ladle of hot water, till the whole becomes a creamy mass, uniform in its appearance. Allow it to rest for three months in a temperate place or cellar.

3. Dissolve a quarter of a pound of lime in a gallon of cold water, then take off the clear; dissolve a half pound of sal-soda in a quart of water, and mix it with the clear lime-water; one pound of brown soap dissolved in a gallon of water, and then to be added to the clear liquor formed with the sal-soda and lime-water, and this forms the soap. This soft soap is excellent for boiling white linens. It removes all grease that is in them, because it contains an excess of caustic lye. About one quart of it is sufficient for boiling clothes in a ten gallon copper. A quantity of this may be made up for constant use.

To Make Good Lye. Use hickory-wood ashes when possible, but those from beech, maple, or any kind of hard wood, except oak, will answer well. A hogshead, set upon an inclined platform, will make a good leach. First in the bottom of the leach pile some wood crosswise of each other, making it a foot high, over this put a piece of old carpet or straw, put on a few inches of ashes, then a peck of lime, fill with ashes, moistened and tamp down well, making it ferment in the centre. Put on warm water. If the lye is not strong enough to float a potato or egg, put back on the ashes again and let run through till it will do so.

Mrs. Gordon's Soft Soap. Shave two and one-half pounds of good white soap and melt in two gallons of soft water, add one and one-fourth pounds of sal-soda and one-quarter pound powdered borax; when all is melted pour in keg or barrel with ten or twelve gallons warm water; stir in thoroughly two table-spoonfuls strong ammonia; two of alcohol; and one of turpentine; stir occasionally till cold. This soap is ready for use as soon as mixed. The borax, soda, turpentine or ammonia may be increased if desired.

Hand-Made Sal-Soda Soap. It sometimes happens that caustic soda is not within reach, and yet sal-soda is to be had. To transform this material into a suitable lye for soap-making is an easy process; dissolve sal-soda, say three pounds, in two gallons of warm water; slack in a firkin three pounds of good lime; add to it the soda solution; stir the whole thoroughly with a stick, and add two gallons of boiling water; stir again, and let it settle.

To make soap pour off the clear liquor into a clean iron boiler and

place on the fire, and stir into it six pounds of clarified grease, and two ounces of powdered borax. Let it boil slowly till it gets thick and ropy (about ten minutes boiling), and pour it into a tub or tight box, as stated above. Soap thus made is an excellent hard soap for family use; after drying a month or so in a dry-room, and cut into bars, it is fit for use.

One Cent a Pound Soap. Soap for family use can be made very cheap and of excellent quality with little trouble by the use of a common article sold in all drug stores. This is lye put up in a concentrated form in small iron boxes holding one pound. These boxes cost about twenty cents, and will make twenty pounds of soap.

The plan of proceeding is merely to take a box of this substance, knock off the lid, and throw it into a gallon of boiling water. After standing ten hours the lye will be clear, and must be thrown into a wash-boiler with another gallon of boiling water; when the contents of the vessel boils, add slowly four pounds of any grease and stir well. When well mixed, the boiler should simmer slowly for four or six hours, and half an hour before taking off, another gallon of hot water may be added, together with half a tea-cupful of salt. The latter is not necessary, however, and if too much is used, the soap is curdled or made short so that it breaks and wastes. When the soap is thought to be done, plunge a case knife in; if the mass drops clear and ropy and chills quickly, it is soap and will be firm and hard when cold. Have ready a tub well wet on the bottom and sides; pour the soap in and let it set; in a few hours it will be hard enough to cut out and be as white as snow.

This process makes twenty-five pounds of soap; or, by the aid of grease, four pounds; lye, one pound; twenty-four pounds of water; (less four pounds driven off in boiling), are converted into excellent soap. Since the grease is saved from the family waste, the soap has only cost what the lye has come to, and as the loss by drying is only twenty per cent., twenty pounds of soap can be made for twenty cents.

Country Soft or Hard Soap. In most parts of the country it is cheaper and much more convenient to make soap from the lye of leached ashes than from a boughten "concentrated lye." Leach the ashes as suggested, then fill a kettle two-thirds full of lye that will float a potato or egg. Put in the fat in a melted condition, a little at a time, and stir well. When the soap gets to the right consistency (which is found by testing) let the fire out and the soap cool. If hard soap is required add salt while hot by handfuls until of proper hardness.

2. A farmers wife give the following method of making soap: "Start

the lye to boiling and then while boiling, if the lye is not strong enough to eat the feather of a quill, boil it down until it is. When it will just eat the feather, let the kettle be a little more than one-third full of lye, and put in grease, skins of the hogs, bacon rinds, meat-fryings, and the like, until the kettle is about two-thirds full. The kettle must not be full, for with the least bit too much fire, over the soap goes. It is better to put in a little less than the necessary amount of grease. Lye and grease combine in certain proportions; but pass the limit no amount of boiling will take up an excess of grease. It will remain on top hot or cold, and it will be very troublesome; whereas a little too much lye will sink to the bottom when the soap comes. If the proportions are good, a little fire only is required to keep it boiling, and in a few hours it is done. Then take a bucket of weak lye and let it boil up with the soap once. This will not disturb the already made soap, but will wash the dirt out that was in the grease, and with it settle to the bottom. When the soap is cold it can be cut out in cakes." A small quantity of salt will help harden.

Fluid Soap. Sweet oil seven parts; caustic potash, one part; rose water, sufficient quantity to reduce it to a proper state. Rub the oil, alkali and a few spoonfuls of the water together in a hot mortar until united, then add the remainder of the water as required.

Wash-Boiler Soap. Take one pound of sal-soda, one pound of yellow bar soap, and five quarts of water. Cut the soap in thin slices, and boil together two hours; strain, and it will be fit for use. Put the clothes to soak the night before you wash, and to every pail of water in which you boil them, add a pound of soap. They will need no rubbing; merely rinse them out, and they will be perfectly clean and white.

White Hard Soap. To fifteen pounds of lard, or suet, made boiling hot, add slowly six gallons of hot lye, or solution of potash, that will bear up an egg high enough to leave a piece big as a shilling, bare. Take out a little and cool it. If no grease comes to the top it is done. If any grease appears, add lye, and boil till no grease rises. Add three quarts of fine salt, and boil up again. If this does not harden well on cooling, add more salt. If it is to be perfumed, melt it next day, add the perfume and run it in moulds, or cut in cakes.

Hard Soap. 1. Take six pounds of sal-soda, six pounds grease, and three pounds lime. Thoroughly mix the soda and lime in four gallons of water, pour off from the sediment, put in the grease and boil twenty minutes; pour off and before entirely cold cut in bars.

2. Glauber salts has been used to harden soap, which made from inferior fats, would otherwise be too soft. This substance (melted on a shovel or otherwise,) added to the soap in the proportion of one pound of the salt to twenty pounds of the soap, is said to remedy the defect, and to make a hard and sound soap out of what would otherwise be too soft for economical use.

3. **HARD SOAP WITH LARD.** Sal-soda and lard, of each six pounds; stone lime three pounds; soft water, four gallons; dissolve the lime and soda in the water, by boiling, stirring, settling and pouring off; then return to the kettle (brass or copper) and add the lard and boil until it becomes soap; then pour into a dish or moulds, and when cold, cut it into bars and let it dry.

4. **HARD SOAP FROM SOFT.** Take seven pounds good soft soap; four pounds sal-soda; two ounces borax; one ounce hartshorn; one-half pound resin, to be dissolved in twenty-two quarts of water, and boiled about twenty minutes.

Whale Oil Soap. For the destruction of insects: render common lye caustic, by boiling it at full strength on quick-lime; then take the lye and boil it with as much whale oil foot as it will change to soap; pour off into moulds, and, when cold, it is tolerably hard. Whale oil foot is the sediment produced in refining whale oil.

How to Test Soap. The value of boiled soaps of course depends greatly on the quality of the materials used. This accounts for the difference in price and quality. The purest materials, such as clean tallow or pure oils, thoroughly saponified, yield the most valuable soaps, costing more per pound, but they are cheaper in the end. A good soap is a perfectly neutral compound, and will in no case injure the most delicate fabrics. The simplest method of testing soap is by tasting. If it is sharp and biting on the tongue, there is an excess of alkali; but if it leaves no unpleasant sensation on the tongue, there is not the least danger that it will rot or otherwise injure clothes in washing.

Resin Soap. About fifteen per cent. of resin can be mixed with tallow without injuring the color and firmness of the soap. A larger proportion deteriorates the quality and produces an inferior soap. Some soap-makers melt the resin and tallow together before mixing; better make a separate soap of each, then mix and boil them together thoroughly for half an hour, and strain through a sieve before filling the frames. Use only the lightest colored resin, if you would have light colored soap.

HOW TO USE CEMENT.

Quality of Sand. The sand should be clean, sharp and coarse. When the sand is mixed with loam the mortar will set comparatively slow, and the work will be comparatively weak. Fine sand, and especially water-worn sand, delays the setting of cement, and deteriorates strength. Damp sand should not be mixed with dry cement, but the cement and sand should be mixed thoroughly and uniformly together, when both are dry, and no water should be applied until immediately before the mortar is wanted for use.

Proportion of Sand. The larger the proportion of cement the stronger the work. One part of good cement to two parts of sand is allowable for ordinary work; but for cisterns, cellars, and work requiring special care, half and half is the better proportion. For floors, the cement should be increased toward the surface.

Water in Concrete. Use no more water in cement than absolutely necessary. Cement requires but a very small quantity of water in crystalizing. Merely dampening the material gives the best results. Any water in excess necessarily evaporates and leaves the hardened cement comparatively weak and porous.

Concrete in Water. Whenever concrete is used under water, care must be taken that the water is still. So say all English and American authorities. In laying cellar floors, or constructing cisterns or similar work, care must always be taken to avoid pressure of exterior water. Cement will not crystalize when disturbed by the force of currents, or pressure of water, but will resist currents and pressure after hardening only. In still water good cement will harden quicker than in air; and when kept in water will be stronger than when kept in air. Cements which harden especially quick in air are usually slow or worthless in water.

Delay in Use. Do not permit the mortar to exhaust its setting properties by delaying its use when ready. Inferior cements only will remain standing in the mortar beds any length of time without serious injury.

How to Put Down Concrete. When strong work is wanted, for cellar floors and all similar work, the concrete should be dampened and tamped down to place, with the back of a spade, or better, with the end of a plank or rammer, then finished up with a trowel, thus leveling and compacting the work. Only persons ignorant of the business will

lay a floor or walk with soft cement mortar. All artificial stone is made in a similar way to that described, and, when set, is strong and hard.

Stone and Brick Work. In buildings constructed of stone and brick, the best protection from dampness and decay, and also from the danger of cyclones, is a mortar of cement and coarse sand. The extra cost is inconsiderable and the increased value of the structure very great. Chimneys made in this manner never blow down, and cellars whose foundations are thus laid are always free from atmospheric moisture. Cement may also be mixed with lime mortar for plastering and other purposes to great advantage.

Effect of Frost and Cold. At a temperature less than 60° F., all good cement sets slowly, though surely, but if allowed to freeze its value is seriously impaired. In cold weather or cold water do not fear to wait for your concrete to crystalize.

Damage From Moisture. Good cement in bags or barrels is not injured by age, if carefully preserved from moisture. Lumps in bags or barrels of cement are caused by exposure to moisture. They prove the good quality of the cement. The Portland cement made at Warners, New York, is the strongest and best in the world.

CIDER, VINEGAR, AND WINES.

Cider, How to Make and Keep. Always choose perfectly ripe and sound hand-picked fruit. Apples that have lain any time on the ground contract an earthy taste, which will always be found in the cider.

After sweating, and before being ground, wipe them dry, and if any are found bruised or rotten, put them in a heap by themselves for an inferior cider to make vinegar.

Always use hair cloths, instead of straw, to place between the layers of pomice. The straw, when heated, gives a disagreeable taste to the cider.

As the cider runs from the press let it pass through a hair sieve into a large open vessel, that will hold as much juice as can be expressed in a day. In a day and sometimes less the pomice will rise to the top, and in a short time grow very thick; when little white bubbles break through it, draw off the liquor by a spigot, placed about three inches from the bottom, so that the settlings may be left quietly behind.

The cider must be drawn off into very clean, sweet casks, and closely

watched. The moment the white bubbles before mentioned are perceived rising at the bung-hole, rack it again. When the fermentation is completely at an end, fill up the cask with cider, in all respects like that already contained in it, and bung it up tight; previous to which a tumbler of sweet oil may be poured into the bung-hole.

After cider is allowed to ferment until it has acquired the desired flavor, it should then be put into clean barrels prepared as follows: dip some strips of rags into melted sulphur, light and hang in the bung-hole and lay the bung loosely on the end of the rag. This is to allow the sulphur vapor to well fill the barrel. Tie up a half pint of mustard seed in a coarse muslin rag and put into the barrel, then put your cider in. Now add a handful of isinglass which "fines" the cider, but does not keep it sweet.

The above is the old fashioned way and will keep cider in the same condition as when put into the barrel, if kept in a cool place, for a year. The sulphur vapor checks the fermentation, and the sulphur in the mustard seed keeps it checked. Professional cider dealers are now using the bi-sulphite of lime instead of the mustard seed and sulphur vapor. The bi-sulphite of lime is what is sometimes sold as a "preserving powder." It is only another form of using the sulphur.

Another method is to add sugar, one and a half pounds of sugar to a gallon of cider and let it ferment. This makes a fermented, clear good cider, but sweet. It lasts sweet about six months if kept in a cool situation.

If it is intended to bottle cider, it should first be examined, to see whether it is clear and sparkling. If not it should be clarified. The night before it is intended to be put in bottles, the bung should be taken out of the cask, and left so until the next day when it may be bottled, but not corked down until the day after, because if this is done at once, many of the bottles would break. The best corks and champagne bottles should be used. The bottled stock should be stored in a cool cellar, where the quality will be greatly improved by age.

To Can Cider. Cider, if taken when first made, brought to boiling heat and canned, precisely as fruit is canned, will keep from year to year without any change of taste. Canned up in this way in the fall, it may be kept a half dozen years or longer, as good as when first made. It is better that the cider be settled and poured off from the dregs, and when brought to boiling heat the scum that gathers on the surface taken off; but the only precaution necessary to preservation of the cider

is the sealing of it up air-tight when boiling hot. The juice of other fruit can be preserved in the same way. To all tastes not already corrupted by strong drink, these unfermented juices are very delicious. The juice of the grape is better than wine a century old, and more healthy.

To Keep Cider Sweet. 1 To one barrel of cider add one pound of mustard seed, two pounds of raisins, and one quarter pound of sticks, (bark) of cinnamon.

2. When fermentation commences in one barrel, draw off the liquor into another one; straining it through a flannel cloth. Put into the cider three-quarters of an ounce of oil of sassafrass, and the same of the oil of wintergreen; shake up well with a pint of alcohol.

3. Much of the excellence of cider depends upon the temperature at which the fermentation is conducted, and is a point greatly overlooked by manufacturers of this liquor. As soon as pressed from the fruit, it should be strained into sulphured casks and placed in a cool situation where the temperature does not exceed 50° F. If left in the heating sun much of the sugar is converted into vinegar by the absorption of atmospheric oxygen, and thus the liquor becomes acid and rough. On the contrary, if the fermentation takes place in a cool situation the flavor and sweetness is retained.

Cider Wine. Let new cider from sour apples ferment from one to three weeks, according to the weather. When it has worked fairly well add to each gallon, one pound of white crushed sugar, and let the whole ferment until it possesses precisely the taste which it is desired should be permanent. In this condition pour out a quart of the cider and add for each gallon one-half ounce of SULPHITE OF LIME, not sulphate. Stir the powder and cider until well mixed, and return the emulsion to the fermenting liquid. Shake briskly and thoroughly for a few moments, and then let the cider settle. Fermentation will cease at once. When after a few days, the cider has become clear, draw off carefully, to avoid the sediment, and bottle. If loosely worked, which is better, it will become a sparkling cider wine, and may be kept indefinitely long.

Cherry Wine. 1. To make five pints of this wine, take fifteen pounds of cherries and two pounds of currants; bruise them together; mix with them two-thirds of the pits, and put the whole of the cherries, currants, and pits into a jug, with a quarter of a pound of sugar to every pint of juice. The jug must be quite full; cover the jug with vine-leaves, and put in a cool place, and let it stand until it has done work-

ing, which takes three weeks; then cork and in two months time it may be bottled.

2. Gather the cherries when quite ripe. Pull them from their stems and press them through a hair sieve. To every gallon of the liquor add two pounds of sugar, stir all together, and put it into a vessel that will just hold it. When it has done working cork it very close for three months, and then bottle it for use.

Grape Wine. Take two quarts of grape juice, two quarts of water, four pounds of sugar. Extract the juice of the grape in any simple way; if only a few quarts are desired do it with a strainer and a pair of squeezers; if a larger quantity is desired, put the grapes into a cheese press, made particularly clean, putting on sufficient strength to extract the juice of a full hoop of grapes, being careful that none but perfect grapes are used, perfectly ripe and free from blemish. After the first pressing put a little water with the pulp and press a second time, using the juice of the second pressing with the water to be mixed with the clear grape juice. If only a few quarts are made place the wine as soon as mixed into bottles, filling them even full and allow to stand in a warm place until it ferments, which will take about thirty-six hours; then remove the skum, cool and put into a dark, cool place. If a few gallons are desired place in a keg or stone jug; but whatever is used must be even full. After thorough working has taken place and the scum removed, bottle and cork tight.

Currant Wine. The currants should be fully ripe when picked; put them into a large tub, in which they should remain a day or two; then crush with the hands, unless you have a small patent wine press, but they should not be pressed too much, or the stems will be bruised, and impart a disagreeable taste to the juice. If the hands are used, put the crushed fruit, after the juice has been poured off, in a cloth or sack and press out the remaining juice. Put the juice back into the tub after cleansing it, where it should remain about three days, until the first stages of fermentation are over, and removing once or twice a day the scum arising to the top. Then put the juice in a vessel—a demijohn, keg, or barrel—of a size to suit the quantity made, and to each quart of juice add three pounds of the best yellow sugar, and soft water sufficient to make a gallon.

Thus, ten quarts of juice and thirty pounds of sugar will give you ten gallons of wine, and so on in proportion. Those who do not like sweet wine can reduce the quantity of sugar to two and a half, or who wish it

very sweet, raise to three and a half pounds per gallon.

The vessel must be full, and the bung or stopper left off until fermentation ceases, which will be in twelve or fifteen days. Meanwhile, the cask must be filled up daily with currant juice left over, as fermentation throws out the impure matter. When fermentation ceases, rack the wine off carefully, either from the spigot or by a syphon, and keep running all the time. Cleanse the cask thoroughly with boiling water, then return the wine, bung up tightly, and let it stand four or five months, when it will be fit to drink, and can be bottled if desired.

All the vessels, casks, etc., should be perfectly sweet, and the whole operation should be done with an eye to cleanliness. In such event, every drop of brandy or other spirituous liquors added will detract from the flavor of the wine, and will not, in the least degree, increase its keeping qualities. Currant wine made in this way will keep for an age.

Ginger Pop. 1. Crushed white sugar, twenty-eight pounds; water, thirty gallons; yeast, one pint; powdered ginger, one pound; essence of lemon, one-half ounce; essence of cloves, one-quarter ounce. On the ginger pour half a gallon of boiling water and let it stand twenty minutes. Dissolve the sugar in two gallons of water, pour both into a barrel half filled with cold water, then add the essence and the yeast; let it stand for half an hour, then fill up with cold water. Let it ferment over night, then bottle.

2. One and a half ounces of the best ground Jamaica ginger, one ounce of cream of tartar, one pound of sugar, and two sliced lemons; to which add four quarts of boiling water; and one-half pint of yeast; let it work for twenty-four hours; strain and bottle it. In a week or two it will be ready for use.

3. Water, five and a half gallons; bruised ginger root, one quarter pound; tartaric acid, one-half ounce; white sugar, two and one-half pounds; whites of three eggs, well beaten; lemon oil, one tea-spoonful; yeast, one gill. Boil the root for half an hour in a gallon of water; strain and put the oil in while hot; mix. Let stand over night, and in the morning skim and bottle.

Vinegar. Good cider vinegar is made by placing the cider in a keg, barrel, or hogshead in a warm dry place, leaving the bung out till it has acquired the required taste. Vinegar will lose after once reaching its greatest strength if left to the open air, and therefore as soon as the cider has changed to vinegar of the required strength, the bung should be placed in the keg or barrel.

MISCELLANEOUS.

Sweaty Feet. A very good cure for the offensive odor of sweaty feet can be made by mixing one-half dram of salicylic acid, one ounce of oxide of zinc, and one ounce of lycopodium. Dust your feet with it several times a day.

Hair Falling Out. A good wash for the hair, to prevent it from falling out, is made by mixing one tea-spoonful of salt, thirty grains of quinine and a pint of common whiskey or bay rum. Rub the hair thoroughly every night.

Healing Cream. This is a good cream, made expressly for rough and dry skins.

1 ounce Spermaceti,
1 ounce White Wax,
1 ounce Olive Oil,
1 table-spoonful Honey.

Melt the ingredients and beat them to a cream.

Chapped Hands. The nicest preparation for chapped hands is composed of quince seed and whisky. There is no rule as to proportion. Put the seeds in a bottle and pour in enough whisky to cover them. As this thickens add more whisky until it is of the right consistency. This healing preparation is far superior to glycerine, as it dries off quickly and leaves a most agreeable odor.

1 part Glycerine,
4 parts Pond's Extract of Witch Hazel,
4 parts Water.

Put in a bottle and shake well; it is ready for use immediately. It is well to shake thoroughly each time of using.

Earache. Ground black pepper placed in a piece of cotton wool and put in the ear (so that no pepper can touch the ear) will often cure severe earache.

Tooth-Wash. A good antiseptic tooth-wash may be made of the following:

1 dram Glycerine of Borax,
1 pint Water.

Brush the teeth after each meal and just before retiring at night.

Tooth Powder. Mix thoroughly equal parts of pulverized borax and orris root, and a little precipitated chalk; a drop or so of rose oil will perfume the powder.

To Remove Tan. A wash for removing tan, and which also makes the skin look fresh is composed as follows:

3 ounces Rosewater,
1 table-spoonful Tincture of Benzoin.

Apply to the face after exposure and before washing.

Black-Heads. These are caused by inactivity of the skin. In addition to the following, thoroughly rub the face with a coarse towel three times a day.

2 drams Lac Sulphur,
1 dram Spirits of Camphor,
 $\frac{1}{2}$ ounce Glycerine,
4 ounces Rose Water,

First expel the black-heads with a watch key or small tube, then bathe your face with hot water at bed-time, dry thoroughly and apply the lotion, leaving it on all night.

To Mend Rubber. Dissolve some small pieces of PURE RUBBER, (not vulcanized) in warm spirits of turpentine, till as thick as syrup. This forms the liquid cement or liquid rubber which is to hold on the patch. Cut the patch the required size, then with sharp sand paper thoroughly rub both the patch and the boot or shoe. Smear both with the liquid rubber four or five times, each time letting it dry. Then once more cover each with the liquid rubber, and immediately put the patch in place, press downward and see that the edges are well fastened. When dry the article is as waterproof as ever.

To Keep Chimneys From Cracking. Put the chimneys into a kettle of cold water or oil and gradually heat till it boils, then let it gradually cool. The chimneys thus treated will not break from the effects of the heat.

Weeds in Garden Walks. Put one ounce of pure carbolic acid in eight gallons of water, and apply this solution with a sprinkling pot to the garden or yard walks. This is an effectual method of preventing the growth of weeds. Do not apply any stronger than here indicated as carbolic acid is a virulent poison, and it might destroy plants outside the walk. In this weak state it will only destroy the smaller plants and the insects around the walk.

Black Boards. To make black boards equal to those coated by the patent slating, follow these directions.

Take enough shellac varnish to cover the required surface, and add lamp black to color, and a small quantity of the flour of emery to give

the surface a fine "tooth" to take hold of the chalk. If adding the lamp-black and emery makes it too thick, thin with alcohol. Do not let this stand in an open can as it will soon evaporate. This is good for slating the inside covers of children's school books, making them equal to slates. The surface can be written on with a slate-pencil and erased the same as from an ordinary slate.

Chimney on Fire. Those who burn wood find that the sides of their chimneys are often covered with soot. This is almost pure carbon and when ignited it forms a very fierce fire. The chimney often takes fire during very dry times and endangers the building.

To extinguish the fire, close all the doors and windows and throw a few handfuls of salt in the stove or fire-place. Salt in burning gives off a gas, charged with chlorine, in which no fire can burn. Remember the salt must be put on a fire, to generate this gas; therefore do not put out your fire in the stove or grate, instead of putting it out, put on the salt and open the draughts.

Marking Sheep. Lampblack mixed with strong vinegar will make a paint for marking sheep that will not injure the wool and will last a year.

To Keep the Ice-Box Sweet. Keep a small dish of charcoal on one of the upper shelves of the refrigerator, as it is an excellent absorbent of odors. It should be changed every few days.

To Keep Sweet Potatoes. The chief requisite in keeping during the winter, sweet potatoes, is to place them where they will be perfectly dry and not come in contact with each other. To accomplish this pack in chaff, placing the tubers in barrels or boxes. Place these boxes in the attic over the kitchen. There they will remain dry. If chaff is not handy they can be packed in dry sand, or, if neither sand nor chaff is available, wrap each potato in two or three thicknesses of newspaper and place in barrels or boxes perfectly free from moisture. Treated thus they will keep perfectly until spring. If no attic is to be had, any dry well-ventilated room that does not freeze will answer.

China Cement. To mend broken china or glass-ware, soak two drams of cut isinglass in two ounces of water for twenty-four hours; boil down to one ounce, add one ounce of spirit of wine and strain through linen. Mix this while hot, with a solution of one dram mastic in one ounce of alcohol, and mix thoroughly with half a dram of powdered gum ammonia.

Length of Nails. This table is very convenient in estimating the amount of nails required to do a certain piece of work, and the size required.

A 3-penny nail is 1 inch long and there are 550 in a pound.

A 4-penny nail is $1\frac{1}{2}$ inches long and there are 350 in a pound.

A 5-penny nail is $1\frac{3}{4}$ inches long and there are 230 in a pound.

A 6-penny nail is 2 inches long and there are 165 in a pound.

A 7-penny nail is $2\frac{1}{4}$ inches long and there are 140 in a pound.

An 8-penny nail is $2\frac{1}{2}$ inches long and there are 110 in a pound.

A 10-penny nail is $2\frac{3}{4}$ inches long and there are 96 in a pound.

A 12-penny nail is 3 inches long and there are 55 in a pound.

A 20-penny nail is $3\frac{1}{2}$ inches long and there are 35 in a pound.

There are 16 spikes in a pound, 4 inches long.

There are 12 spikes in a pound, $4\frac{1}{2}$ inches long.

There are 10 spikes in a pound, 5 inches long.

There are 7 spikes in a pound, 6 inches long.

If a board fence is four boards high and there are six nails in each board, it will take twenty-four nails for each panel. If 10-penny nails are used a pound of nails will build four panels of fence, &c., &c.

To Clean Rusty Plows. Take a quart of water and pour slowly into half a pint of sulphuric acid. (The mixture will become quite warm from chemical action, and this is the reason why the acid should be poured slowly into the water, rather than the water into the acid). Wash the mould-board (or any other iron that is rusty) with this weak acid, and let it remain on the iron until it dries. Then wash once more. Give time for the acid to dissolve the rust. Then wash with water, and where the worst rusty spots are, apply some more acid, and rub those spots with a brick. The acid and the scouring will remove most of the rust. Then wash the mould-board thoroughly with water to remove the acid, and rub it dry. Brush it over with petroleum or other oil, or lard and resin as just recommended, if it is not to be immediately used. When you go to plowing, take a bottle of the acid water to the field and apply it frequently to any spot of rust that may remain. The acid and the scouring of the earth will soon make it bright and clean.

How to Loosen Nuts. When nuts and screws have become fast from rust, pour on them a little kerosene, and wait a few minutes until it becomes soaked with the liquid. When this is done they can be easily started and the bolt saved.

Concrete Door-Steps. Make a box at the door where the steps are wanted just the size and shape of the required steps. Then mix up coarse gravel or Portland cement and make a mortar or concrete, mixing in cobble-stones, and fill the boxes or molds. After a time remove the moulds, and place boards on the steps for people to walk over till the concrete has thoroughly hardened. If rightly made, these cement steps will remain hard and perfect, and neither the frost nor weather will injure them. They should be made in the spring of the year, so that they can have the summer and fall to harden in.

To Mix Mortar. Take four parts coarse and three parts fine sand, with one part of quick-lime, mix well, using but little water. This makes mortar which soon becomes as hard as adamant; resisting all atmospheric action as durably as the material it unites; and with the addition of a portion of manganese, it will harden under water.

To Keep Cellars from Freezing. A good plan to keep out the frost is to take either old newspapers or coarse brown paper, and with a strong size, paste them four or five thicknesses thoroughly to the stone walls of the cellar and to the bare timbers overhead, leaving an air space between them and the floor. It will not be necessary to press the paper down into all the depressions of the wall; every air space is an additional defense against the cold. If this plan is adopted and carefully executed the cellar will be frost-proof, even if it is left unbanked.

Iron and Steel Kept from Rusting. A coating of three parts lard and one part resin, applied to tools of iron or steel, will effectually prevent rust.

To Preserve Shingles. Take a potash kettle, or large tub, and put into it one barrel of lye of wood ashes, five pounds of white vitrol, five pounds of alum, and as much salt as will dissolve in the mixture. Make the liquor quite warm, and put as many shingles in it as can be wet at once. Stir them up with a fork, and, when well soaked, take them out and put in more, renewing the liquor as necessary. Then lay the shingles in the usual manner. After they are laid, take the liquor that was left, put lime enough in it to make whitewash, and, if any coloring is desirable, add ochre, Spanish brown, lamp-black, etc., and apply to the roof with a brush or an old broom. This may be renewed from time to time. Salt and lye are preservatives of wood. It is well known that leach tubs, troughs, and other articles used in the manufacture of potash, never rot. They become saturated with the alkali, turn yellowish inside, and remain impervious to the weather.

Shingles Made Fire-Proof. A wash composed of lime, salt, and fine sand or wood ashes, put on in the ordinary way of whitewashing, renders the roof much more secure against taking fire from falling cinders, in case of fire in the vicinity. It pays the expense a hundred fold in its preserving influence against the effects of the weather. The older and more weather-beaten the shingles, the more benefit derived. Such shingles generally become more or less warped, rough and cracked; the application of the wash, by wetting the upper surface, restores them at once to their original or first form, thereby closing up the space between the shingles, and the lime and sand, by filling up the cracks and pores in the shingle itself, prevents its warping.

Keeping the Moth from Furs. Darkness is all that is necessary. The "miller," the eggs from which moths are hatched, only moves in the light; the moths themselves work in darkness. Hang the furs in a very dark closet and keep the doors shut; keep it always dark, and you can have no trouble. But, as closet doors are sometimes left open, the better way is to enclose the articles in a paper, put this in a pillow-case, or wrap around a cloth, and hang it up in a dark closet. Camphor may be placed in the bag as a preventive. Do not take out the furs in June or July to give them an "airing," for then comes the enemy, and it may be that, in fifteen minutes after exposure, it has deposited a hundred eggs. If you consider an airing indispensable, give the furs a good switching, and put them quickly back.

Remedy for Chafing. Among the annoyances to which fleshy persons are subject in hot weather, especially if they walk much, is chafing in those parts where the flesh rubs together or folds. Nothing is better, as a remedy and also as a preventive, than a solution of alum in water. It should be applied with a soft rag at night, before retiring. A piece of alum as large as a hazel nut, dissolved in half a pint of water is sufficient. It will quickly heal and harden the tender skin.

In-Growing Toe-Nails. This most painful of the diseases of the nails is caused by the improper manner of cutting the nail (generally of the great toe), and then wearing a narrow, badly-made shoe. The nail being too long, and rather wide at the corners, is often trimmed around the corner, which gives temporary relief. But it then begins to grow wider in the side where it was cut off; and, as the shoe presses the flesh against the corner, the nail cuts more and more into the raw flesh, which becomes excessively tender and irritable. If this state continues long, the toe becomes more and more painful and ulcerated, and "proud

flesh'' sprouts up from the sorest points. Walking greatly increases the suffering, till positive rest is absolutely necessary.

Begin the effort at cure by simple application to the tender part of a small quantity of perchloride of iron. It is found in drug stores in a fluid form, though sometimes in powder. There is immediately a moderate sensation of pain, constriction, or burning. In a few minutes the tender surface is felt to be dried up, tanned, or mummified, and it ceases to be painful. The patient, who before could not put his foot to the floor, now finds that he can walk upon it without pain. By permitting the hardened, wood like flesh to remain for two or three weeks, it can be easily removed by soaking the foot in warm water. A new and healthy structure is found, firm and solid, below. If thereafter the nails be no more cut around the corners or sides, but always curved in across the front end, they will in future grow only straight forwards; and by wearing a shoe of reasonably good size and shape, all further trouble will be avoided.

Another method is with a knife, or a piece of glass, scrape the centre of the nail until it becomes almost as thin as the thinnest paper; then cut the nail in the form of a crescent, the convex side being inward. This will compel the sides of the nail to grow outward in the natural way.

To Stop Leaks Around Chimneys. These may be stopped by applying a paste made of tar and dry, sifted road dust. The paste should be lapped over the shingles to form a collar, so as to carry off the water that flows down the side of the chimney.

To Keep Out Strong Sunlight. If there is a window in a stable, outhouse, or kitchen, so situated that the sun's rays in passing into the building is annoying, the glass can be made to keep out the direct rays, as well as if the sash was filled with ground glass, as follows: pound gum tragacanth to a powder, and put it, for twenty-four hours to dissolve in white of eggs, well beaten. Lay a coat of this on your glass and let dry.

Fireproof Wash for Roofs. Slack lime in a barrel which should be kept covered, and when slacked and thoroughly cold pass through a fine sieve. To every six quarts of this lime add one quart of rock salt and one gallon of water. After this boil and skim clean. To every five gallons of this add, by slow degrees, three-quarters or a pound of potash and four quarts of fine sand. Coloring matter may be added if desired. Apply with a paint or whitewash brush. The wash looks as good as

paint and is almost as durable as slate. It will stop small leaks in a roof, prevent the moss from growing over it, and render it incombustible from sparks which might fall upon it. When applied to brick work, it renders the brick waterproof; it lasts as long as paint, and the expense is a mere trifle.

Moss on Roofs. Moss should never be allowed to gather on the roofs of buildings. Shingles will rot fast enough from the moisture held by themselves without aid from that retained by the moss. To remove, sprinkle some fine lime upon the shingles just before a rain, and the moss will be taken off almost clean. Repeat the lime if necessary just before the next shower.

Awnings and Tents Made Mildew Proof. As mildew is a plant living at expense of other matter, its prevention requires something destructive to vegetable life, and a kind of varnish to close the pores of the texture of the linen awning, to protect it against the chemical influences of the atmosphere and the penetration of the fine root filaments of the fungus which has great vitality. Different varnishes will answer the purpose. It is best first to moisten the linen with a solution of arseniate of potash, which has the special property of preventing organic changes. After drying, put on a benzine varnish. Carbolic acid has the same effect, when the cloth is steeped in it; but it may discolor the canvas, and it may be washed out by repeated rains.

To Soften Putty. To remove old putty from broken windows, dip a brush or swab in nitric and muriatic acid equal parts, or caustic soda (concentrated lye) and paint over the dry putty that is fastened to the sash or glass and in an hour the putty will have become so soft as to be easily removable.

To Kill Thistles. Cut the thistles to the ground and cover the fresh cuts with salt. Old brine from the pork, beef, or fish barrel may be used if desired.

Offensive Breath. Scarcely anything is more disagreeable or disgusting than a stinking breath. Various means have been proposed to remove this annoyance, depending principally upon the administration of aromatics, which by their odor might smother it for a time; but these require continual repetition and are liable to interfere with the organs of digestion. The real cause of a stinking breath is either a diseased stomach or carious teeth; when the former is the case, aperients should be administered; and if these do not succeed, an emetic may be given, followed by a dose of salts, or castor oil occasionally. When rotten

teeth are the cause, they should be removed; or if this be impossible, they should be kept clean. Dirty teeth often cause the breath to smell. The use of tooth powder should be a daily habit.

From six to ten drops of the concentrated solution of chloride of soda, in a wine glassful of spring water, taken before breakfast each morning, will instantly sweeten the breath by disinfecting the stomach. If necessary this may be repeated in the middle of the day. In some cases the odor arising from decayed teeth is combined with that of the stomach. If the month is well rinsed with a teaspoonful of the solution of the chloride in a tumbler of water, the bad odor of the teeth will oftentimes be removed.

Honing a Razor. Let the hone be seldom and but sparingly used, and never, unless by frequent and repeated stropping the edge of the razor, is entirely destroyed; use the best oil and be careful to preserve the hone clean and free from dust. Previous to the operation of shaving, it will be found of service, particularly to those who have a strong beard and a tender skin, to wash the face well with soap and water, and the more time is spent in lathering and moistening the beard, the easier will the process of shaving become. Dip the razor in hot water before applying it to the face; use the razor nearly flat, always taking care to give it a cutting instead of a scraping direction. Strop the razor immediately after using it, for the purpose of effectually removing any moisture that may remain upon the edge, and be careful not to employ a common strop, as the composition with which they are covered is invariably of a very inferior quality, and injurious to a razor. The strop should always be of the best manufacture, and when the composition is worn off, it will be found particularly useful to rub it over, lightly, with a little clean tallow, and then put upon it the top part of the snuff of a candle, which being a fine powder, will admirably supply the place of the best composition ever used for the purpose.

Washing Stable Blankets. This preparation will be found as useful in the family washing as in cleansing stable clothing. There is nothing that will injure the clothing if directions are followed. This may take the place of the popular Javelle water. Take a quarter of a pound of soap, a quarter of a pound of soda, and a quarter of a pound of lime. Cut up the soap, and dissolve it in one quart of boiling water; pour one quart of boiling water over the soda, and three quarts of boiling water upon the quick-lime. The lime must be quick and fresh; if it is good, it will bubble up on pouring the hot water upon it. Each must

be prepared in separate vessels. The lime must settle so as to leave the water on the top perfectly clear; then strain it carefully (not disturbing the settlings) into the wash-boiler with the soda and soap; then add six gallons of soap water. They must be put in soak over night, after rubbing soap upon the dirtiest parts of them. After having the above in readiness, wring out the clothes which have been put in soak, put them on to boil, and let each lot boil half an hour; the same water will answer for the whole washing. After boiling each lot half an hour, drain them from the boiling water, put them in a tub, and pour upon them two or three pailfuls of clear, hot water; after this they will want but very little rubbing; then rinse through two waters.

New Washing Soda. It has been found that the hyposulphite of soda, which is now manufactured very cheaply, for the use of photographers, is much better than the common washing soda to wash delicate objects. It attacks neither the skin of the hands nor the objects to be washed, as does the common soda; and at the same time it is an effective bleaching agent, and takes out many spots better than any other substance.

Tender Feet. Wear woolen socks or stockings, and change them frequently. Bathe both your feet and lower limbs in a solution of common salt, a pound of salt to a gallon of water. When spring water is used, add a table-spoonful of carbonate of soda to every pint of water. Use boots or shoes with soft leather uppers, and soles not too thin.

Blistered Feet. To cure blistered feet from long walking, rub the feet, on going to bed, with alcohol mixed with tallow.

Frost-Bitten Feet. To relieve the intense itching of frost-bitten feet, dissolve a lump of alum in a little water, and bathe the part with it, warming it before the fire. One or two applications are sure to give relief.

Cold Feet at Bed-Time. Draw off the stocking, just before undressing, and rub the ankles and feet with the hand as hard as can be borne for five or ten minutes. This will diffuse a pleasurable glow, and those who do so will never have to complain of cold feet in bed. Frequent washing and rubbing them thoroughly dry with a linen cloth or flannel, is useful for the same purpose.

Ink Indicator. Fill one two-ounce bottle with a saturated solution of oxalic acid, (as much as the water will dissolve) and another with a saturated solution of chloride of lime; label each, then with a little glass rod or wood tooth-pick with smooth end, apply a little of the acid to a

blot or ink mark, gently rubbing till the ink is solved; blot the paper; then apply in the same way with a separate rod a little of the chloride of lime solution; then a little more of the acid; blot; repeat if necessary.

Golden Healer. Melt eight ounces yellow beeswax with one pound lard, over hot water, and then stir in one ounce camphor gum, till it is dissolved, cool till the hand can be borne on pan, and then thoroughly stir in one ounce oil organum, and one ounce laudanum, till all is free from lumps. Keep in covered tin boxes. This makes a very soothing application for wounds and burns.

To Prepare and Pickle Tripe. First turn the "ponch" inside out, then sew it up tight, so that no lime can get into it. Have a tub of lime-water as thick as good thick white-wash; let it remain in this from ten to twenty minutes, or until the dark outside skin will come off; then put it into clean water, changing three or four times to weaken the lime, so that the hands will not be injured by it; then with a dull knife scrape off all of the dull surface, and continue to soak and scrape several times, which will remove all offensive substances and smell. After this, let it soak twenty or thirty minutes in two or three hot waters, scraping over each time; then pickle in salt and water twelve hours, and it is ready for cooking; boil from three to four hours, cut in strips to suit, and put it into nice vinegar with the various spices, as desired; renew the vinegar at the expiration of one week, and when thoroughly pickled it is ready for use.

Grinding Tools. More than one-half of the wear and tear, and breakage and bother of dull tools comes from a lack of proper knowledge and practice in grinding. All fine steel is composed of individual fibres laid lengthwise in the bar, held firmly together by cohesion; and in almost all farm implements of the cutting kind the steel portion which forms the edge; if from a section of a bar, is laid in welded to the bar lengthwise, so that it is the side of the bundle of fibres hammered and ground down that forms the edge. Hence, by holding on the grindstone all edge-tools, as axes, drawing-knives, knives of reapers, scythes, knives of straw-cutters, etc., in such a manner that the action of the stone is at right angles with the plane of the edge, or, in plainer words, hold the edge of the tools square across the stone, and the sides will be ground so as to present the ends instead of the side as a cutting edge. By grinding in this manner a finer, smoother edge is set, the tool is ground in less time, holds on edge much longer, and is less liable to nick out or break.

Prepared Fire Kindler. Take one quart tar, three pounds resin; melt them; when cool add one gill spirits of turpentine, and mix as much sawdust, with a little charcoal, as can be worked in; spread out while hot on a board; when cold break up in small lumps about the size of hickory nuts. They will ignite with a match and burn with a strong blaze long enough to start the dry wood used as kindlings.

To Make Canvass Water-Proof. It is convenient to have a large canvass to throw over a load of furniture or other material that rain would spoil. To make such a canvass water-proof is very easily done. Use:

4 pounds White Lead.
1 pint Turpentine.
 $\frac{1}{2}$ ounce White Vitriol.
 $\frac{1}{2}$ ounce Sugar of Lead.

Thin with boiled linseed oil and apply with a paint brush to the canvass or linen.

To Clean Sheepskin Wagon-Rugs. Make a very strong lather, by boiling soap in a little water, mix this with a sufficient quantity of moderately warm water, to wash the mat or rug in, and rub boiled soap on those portions of it which require additional cleansing. When the mat has been well washed in this water prepare another in the same way, in which a second washing must take place, followed by a third, which ought to be sufficient to cleanse it thoroughly. Rinse it well in cold water until all the soap is removed, and then put it in water in which a little blue has been mixed, sufficient to keep the wool of a good white, and prevent its inclining to yellow. After this it should be thoroughly wrung, shaken, and hung out in the open air with the skin part towards the sun, but not while it is scorching hot, otherwise the skin will become hard. It must also be shaken often while drying, for if not it will be quite stiff and crackly. It should be frequently turned, being hung up first by one end and then by the other, until it has dried thoroughly.

To Prepare Sheepskins for Mats. Make a strong lather with hot water, and let it stand till cold; wash the fresh skin in it, carefully squeezing out all the dirt from the wool; wash it in cold water till all the soap is taken out. Dissolve a pound of each of salt and alum in two gallons of hot water, and put the skin into a tub sufficient to cover it; let it soak for twelve hours, and hang it over a pole to drain. When well drained, stretch it carefully on a board to dry, and stretch several times while drying. Before it is quite dry, sprinkle on the flesh side one

ounce each of finely pulverized alum and saltpetre, rubbing it in well. Try if the wool be firm on the skin; if not, let it remain a day or two, then rub again with alum; fold the flesh sides together and hang in the shade for two or three days, turning them over each day till quite dry. Scrape the flesh side with a blunt knife, and rub it with pumice or rotten stone.

Bleaching Straw Hats. To bleach a white straw hat which has been yellowed by the sun, procure a deep box, air-tight if possible; place at the bottom a stone, on the latter lay a flat piece of red hot iron, or a pan of charcoal, and on this scatter powdered brimstone; hang the hat inside, close the lid, and let it remain all night.

To Dry Roots. They should be thoroughly washed to get rid of the dirt, and also some of the mucous substance that would otherwise render them moldy; the larger should then be cut, split, or peeled, but most aromatic roots must not be peeled as the odor is in the bark; then spread on sieves or hurdles and dry in a heat of about 120° F., either on the top of an oven, in a stove, or a steam closet, taking care to shake them occasionally to change the surface exposed to the air. Thick and juicy roots, as rhubarb, briony, peony, water-lily, etc., cut in slices, string upon a thread and hang in a heat of about 90° to a 100° F. Squills are scaled, threaded, and dried in an ordinary warming oven on the back of a stove. Rhubarbs should be washed to separate the mucous principle which would otherwise render it black and soft when powdered. Potatoes are cut in slices and dried.

To Dry Parsley. Cut a large basketful of the best looking curled parsley, pick out all faded or dirty leaves, and dry the remainder carefully before a clear fire. At first the leaves will become quite limp, and they must be turned before the fire to expose all parts equally to the heat, until the leaves are dry and brittle, without losing their green color, if they are allowed to get brown they are spoiled. When dry, rub them to powder between the hands; sift the powder through a coarse sieve, and bottle for use; it will retain both the color and flavor of green parsley. A large basket of fresh leaves will hardly yield a pint of powder. Never dry it in the sun, or it will lose much of its flavor.

To Remove Stumps. 1. In the fall of the year bore an inch hole eighteen inches deep into the centre of the stump and put in an ounce of saltpetre, filling up with water, and plug the hole up. In the spring take out the plug, put in a half gill of kerosene and set fire to it. It will burn the stump out to its farthest roots.

2. In the fall with an inch auger bore a hole in the centre of the stump ten inches deep, and put into it half a pound of oil of vitriol, and cork the hole up very tight. In the spring the whole stump and the roots will be found so rotten they can be easily removed.

The above methods are useful to remove stumps where they are in lawns, or near sidewalks, or in other situations where it is not convenient to pull out with a stump-puller or to dig out.

Squeaking Boots and Shoes. This is caused by the rubbing together of two dry pieces of leather or stitches moving through the leather. To prevent squeaking some shoemakers put a fine hair felt between the layers of leather in the soles. If you have a pair of "ready-made" shoes and the squeak commences it can be stopped by thoroughly saturating the sole and the seams with neat's-foot or boiled linseed oil.

How to Cool a Sick Room. The simplest way to cool a room is to wet a cloth of any size, the larger the better, and suspend it in the place you want cooled. Let the room be well ventilated, and the temperature will sink from 10° to 12° F. in an hour. This is the plan adopted by many eastern nations.

2. A large cake of ice in a tub in a corner of a room, left uncovered so that it can melt, will also reduce the temperature. Ice in changing to water absorbs a large quantity of heat. A small handful of salt sprinkled over the ice will hurry the process of melting, thus more quickly absorbing the heat from the air.

Cheap Home-Made Ice Box. Take two dry-goods boxes, one of which is enough smaller than the other to leave a space of about three inches all around when it is placed inside. Fill the space between the two with sawdust packed closely, and cover with heavy lid made to fit neatly inside the larger box. Insert a small pipe in the bottom of the inside box to carry off the water from the melting ice. For family use this has proved quite as serviceable and as economical in the use of ice as more costly "patent refrigerators."

Use of Grindstones. The outside face of every grindstone on which edge-tools are ground should run as true as the dressed surface of a millstone, as it is impracticable to grind a tool correctly on a stone that revolves with an uneven motion. If the face of a stone varies half an inch in each revolution, the most expeditious way to put it in order is to loosen the wedges with which it is keyed to the journal and re-hang it. Then secure the bearings so that they cannot be easily lifted out of

the boxes, and turn the face off true and smooth. Let a firm rest be fixed close to the face before attempting to turn the stone true. The rest must be solid with the surface close to the stone, so that when the turning instrument comes in contact with the stone, it will remove a thin chip without springing away from the stone. Stone-turners always employ for a turning-tool the end of a bar of very soft iron, drawn out to a point, and turned up at the end for gouging. A piece of soft iron is far more effective than steel.

Tar the centre of grindstones, in order to compel those who grind upon them, to grind on the edges, forming a raised centre, which gives a better opportunity to put a good edge on a tool than a level surface does. The ring of tar should be quite narrow, and all who grind will be compelled to use the edges of the stone, as they cannot grind where the tar is. This remedy should be tried where farm hands will not heed your orders to wear the stone off the edges.

Cellar Floors Made Water-Proof. When cellar floors are not subjected to a great outside pressure of water, a good cement will form a tight cellar bottom and sides; but when the whole soil is full of water, and the cellar is like a basin in it, the pressure of the water upward will surely find crevices through which it will ooze. The cure for this state of things is to get drainage, if possible, and if this cannot be had, and repeated patching will not stop the leaks, in a very dry time take up the top of the floor, and after covering the whole with a layer of gravel, pour into it melted asphaltum, which should be rolled and pounded down while warm, and one or two more layers applied, topping with sand. If the gravel can be hot also, it will make a much better floor; but if it cannot be, some coal tar may be mingled with the asphaltum, and the gravel coated slightly with it before the hot asphaltum is applied.

Ashes for Cellar Floors. When it is not thought desirable to go to the expense of cement, an excellent substitute is secured by taking coal-ashes and mixing it with water to the ordinary thickness of mortar. It does not matter how many lumps or stones there are. Put it on about four inches thick; let it lay twenty-four hours, and then stamp it with a heavy block of wood three or four times a day until it is perfectly hard. It will not crack nor scale off.

Basement Floors. In the preparation for laying the floor, the ground underneath is dug out, so as to leave what is termed an "air space" between it and the joists. The airing of the under side of the floor is procured at the expense of the comfort of the upper surface, and

consequently of that of the house itself; for the inch flooring is but slight defense against the cold, which must necessarily find its way beneath. A far better mode of flooring basements, cottages, dairies, etc., is to spread on the ground a bed of air-slacked lime, on which the joists should rest and be sunk, say an inch or two deep, so as to leave no chance for the air to enter, and at the same time effectually keep out all vermin, as they will not attempt to burrow in lime. This is one of the cheapest ways of securing comfort and durability. Ten bushels of lime is ample for a square of ten feet, (one hundred square feet), and there are very few localities in which lime is not cheap and plenty. Such an underlaying of lime will prove a most desirable preservative of basement floors, and render a dwelling sanitary, warm and sound.

Carbonic Gas in Wells. It is well known that many accidents occur to persons going down into wells to clean them, owing to the gas (carbonic dioxide) in such places. To remove the gas, before going down into the well a quantity of burned but unslacked lime should be sprinkled down. This, when it comes in contact with the water, sets free a great quantity of heat in the water and lime, which rushes upward, carrying all the deleterious gas with it; after which, the descent may be made with perfect safety. The lime also absorbs the gas in the well. Always lower a light before descending, if it goes out there is still danger of suffocation.

Another simple method is to let an umbrella down and rapidly haul it up a number of times in succession. The effect is to remove the gas in a few minutes from a well so foul as to instantly put out a candle previous to the use of the umbrella.

Castor Oil. The fact that castor oil is as useful in the trades as in medicine, is not as commonly known as should be. A few of the uses are here given, as it is very useful on the farm, in the barn, carriage-house and dwelling.

It will soften and renew old leather better than any other oil known. When boots and shoes are greased with it, the oil will not at all interfere with the polishing afterwards, as is the case with lard, olive, or any other kind of oil. Leather belts for transmitting motion in machinery will usually last from three to five years, according to the wear and tear they are exposed to; when greased with castor oil they will last ten years or more, as they always remain flexible and do not crack. Besides this advantage, castor oil prevents slipping, so that a belt three inches wide, impregnated with it, will be equal to a belt four and a half inches

wide without castor oil. It is necessary, however, to wait twenty-four hours till the oil has disappeared from the surface and penetrated the leather, otherwise the freshly greased surface will cause slipping. Another advantage of castor oil is that rats and other vermin detest anything impregnated with it, and will not touch it. It is the best lubricator in use for wagon wheels.

To Grease Wagons. A well made wheel will endure common wear from ten to twenty-five years, if care is taken to use the right kind and proper amount of grease; but if this matter is not attended to, they will be used up in five or six years. Lard should never be used on a wagon, for it will penetrate the hub, and work its way out around the tenons of the spokes, and spoil the wheel. Tallow is the best lubricator for wooden axle-trees, and castor oil for iron. Just grease enough should be applied to the spindle of a wagon to give it a light coat; this is better than more, for the surplus will work out at the ends, and be forced by the shoulder-bands and nut-washers into the hub around the outside of the boxes. To oil an axle-tree, first wipe the spindle clean with a cloth wet with spirits of turpentine, and then apply a few DROPS of castor oil near the shoulders and end. One tea-spoonful is sufficient to oil the four wheels of a carriage.

To Mend Large Holes in Tinware. Take a vial two-thirds full of muriatic acid, put into it all the chippings of sheet zinc it will dissolve, then put in a crum of sal-ammoniac, and fill up with water. Wet the place to be mended with this liquid, put a piece of zinc over the hole, and apply a spirit lamp or candle below it, which melts the solder on the tin, and causes it to adhere.

Varnish for Tools. Take tallow, three ounces; resin, one ounce, and melt together. Strain while hot to get rid of specks which are in the resin; apply with a brush a thin coat to your tools and it will keep off rust for any length of time.

Dead Black Stove-Pipe Varnish. Asphaltum, one pound; lamp-black, one-quarter pound; resin, one-half pound; spirits of turpentine, one quart. Dissolve the asphaltum and resin in the turpentine; then rub up the lamp-black with linseed-oil, only sufficient to form a paste, and mix with the others. Apply with a brush. This is also excellent for coal-hods.

How to Make Sauerkraut. Let the barrel to be used be thoroughly scalded out; the cutter, the tub and the stamper also well scalded. Take off all the outer leaves and halve the cabbages, remove the heart

and proceed with the cutting. Lay some clean leaves at the bottom of the barrel, sprinkle with a handful of salt, fill in half a bushel of cut cabbage, stamp gently until the juice makes its appearance, then add another handful of salt, and so on until the barrel is full. Cover over with cabbage leaves, place on top a clean board fitting the space pretty well, and on top of that a stone weighing twelve or fifteen pounds. Stand away in a cool place, and when hard freezing comes on remove to the cellar. It will be ready for use in from four to six weeks.

Elderberry Ink. Place in an earthen vessel some bruised elderberries and keep in a warm place for three days, then press and filter. The filtered juice is of such an intense dark color that it takes two hundred parts of water to reduce it to the shade of dark red wine. Add to ten quarts of this filtered juice one ounce of sulphate of iron, and the same quantity of crude pyroligneous acid. The ink when first used has a violet color, but when dry is indigo-blue black.

Black Ink. Take one-half pound of the dry extract of logwood, and dissolve in one gallon of water. To this add one-quarter ounce of the bi-chromate of potash. The result is a beautiful blue-black ink. This ink should not be allowed to freeze, as freezing will ruin the color. If it flows too freely add a little sugar.

Ink Powder. 1. Sulphate of copper, one dram; gum Arabic, one-quarter ounce; copperas, one ounce; nutgalls and extract of logwood, four ounces each; all to be pulverized and evenly mixed.

2. Sulphate of iron, two ounces; galls, five ounces; gum Arabic, one ounce. Reduce to a powder and divide into one ounce papers, each of which will make one-half pint of ink.

3. Aleppo galls, three pounds; copperas (dry but not calcined,) one pound; gum Arabic, six ounces; white sugar, two ounces; all in powder; mix. One pint of boiling water poured on two ounces makes a pint of ink.

Japan, or Glossy Ink. In six quarts of water boil four ounces of logwood in chips cut very thin. Boil for nearly an hour, adding from time to time a little boiling water to compensate for waste by evaporation. Strain the liquor while hot; allow it to cool, and make up the quantity equal to five quarts by the addition of cold water. To this add one pound of blue galls coarsely bruised, or one-quarter pound of the best galls in sorts, four ounces of sulphate of iron calcined to whiteness, one-half ounce of acetate of copper, previously mixed with a little of the liquid till it forms a smooth paste, three ounces of coarse sugar, and six

ounces of gum Arabic. Add these ingredients one after another, having the previous ingredient thoroughly dissolved before adding the next. The composition produces the ink usually called Japan ink, from the high gloss which it exhibits when written with.

Blackberry Cordial. To one gallon of blackberry juice add four pounds of white sugar; boil and skim off, then add one ounce of cloves, one ounce of cinnamon, ten grated nutmegs, and boil down till quite rich; then let it cool and settle, afterward drain off, and add one pint of good brandy or whisky.

Ginger Cordial. Pick one pound of large white currants from their stalks, lay them in a basin, and strew over them the rind of an orange and a lemon cut very thin, or half a teaspoonful of essence of lemon, and one ounce and a half of the best ground ginger and a quart of good whisky. Let all lie for twenty-four hours. If it tastes strong of the ginger, then strain it; if not, let it lie for twelve hours longer. To every quart of strained juice add one pound of loaf sugar pounded; when the sugar is quite dissolved and the cordial appears clear, bottle it. This cordial is also good made with raspberries instead of currants.

Strawberry, or Raspberry Cordial. Sugar down the berries over night, using more sugar than you would for the table, about half as much again. In the morning lay them in a hair sieve over a basin; let them remain until evening, so as to thoroughly drain; then put the juice in a thick flannel bag; let it drain all night, being careful not to squeeze it, as that takes out the brightness and clearness. All this should be done in a cool cellar, or it will be apt to sour. Add brandy in proportion of one-third the quantity of juice, and as much more sugar as the taste demands. Bottle it tightly. It will keep six or eight years, and is better at last than at first.

How to Test the Richness of Milk. Procure any long glass cologne bottle or long phial. Take a narrow strip of paper, just the length from the neck to the bottom of the phial, and mark it off with one hundred lines at equal distances; or, if more convenient, and to obtain greater exactness, into fifty lines, and count each as two, and paste it upon the phial, so as to divide its length into a hundred equal parts. Fill it to the highest mark with milk fresh from the cow, and allow it to stand in a perpendicular position for twenty-four hours. The number of spaces occupied by cream will give you its exact percentage in the milk, without any guess work.

If you wish to carry the experiment further, and ascertain the per

centage of butter, set the milk in a large dish, and collect say one hundred or two hundred ounces of cream; make your butter in the cream and ascertain the number of ounces of butter you have made.

Thus if two hundred ounces of milk produces ten ounces of cream, and ten ounces of cream produces four ounces of butter, it is evident that two hundred ounces of milk will produce four ounces of butter.

Good Milk. Milk is a fluid of white, yellowish-white, or bluish-white color, consisting largely of water, and holding in solution or suspension butter, sugar of milk, caseine, and certain salts. These substances are found in all unadulterated milk in constant proportions, except in cases of milk of diseased cows. The sum of the solids, however, varies with the feed, stock and condition of the animal; it should never fall below twelve per cent., ranging generally between twelve and fifteen per cent., the rest being water. The composition may be assumed as follows :

Butter	-	-	-	-	-	-	3.60 to	4.8 per cent.
Caseine	-	-	-	-	-	-	3.80 to	4.2 per cent.
Sugar of milk	-	-	-	-	-	-	4.2 to	4.5 per cent.
Salts	-	-	-	-	-	-	0.6 to	0.8 per cent.
Total solids	-	-	-	-	-	-	12.2	14.3

There are cases where the solids will rise as high as sixteen and seventeen per cent.; the butter as high as nine per cent.; but such milk is never found in the market, being consumed altogether by the owners of the animals. On the other hand, there may be found milk, as in fresh milch cows, where the solids will go down to ten per cent., the butter to three per cent.; these are the extreme limits, below which examine for adulteration.

Milk, To Tell When Adulterated. The cheapest and easiest method of adulterating milk is by adding water, and we may readily ascertain the exact extent of adulteration by the following plan. If a glass tube, divided into one hundred parts, be filled with milk and left standing for twenty-four hours, the cream will rise to the upper part of the tube, and occupy from eleven to thirteen divisions, if the milk is genuine.

Dandruff. I. Dandruff may be caused by wearing close and heavy hats and caps, by the application of oils or dyes to the hair, by confining the hair too closely to the head, by excessive brain-labor, by uncleanness, or by all these causes combined. To effect a cure, wear the hair short,

let the head-covering be as light and well-ventilated as possible, avoid all applications of grease or dyes, exercise the brain less and the body more, and wash the head thoroughly two or three times a day in cold water, and follow each washing by a vigorous rubbing with the balls of the fingers. The better the general health is and the stronger the digestion, the less tendency there will be to this disease, as well as to all others.

2. Take carbolic acid, one-half dram; oil of bergamont one dram; glycerine, two ounces; mix; rub thoroughly into the root of the hair, and apply bay rum freely afterwards; one application will cleanse the hair and scalp as clean as they can be desired. Its use once a week will keep the hair soft and glossy, and will prevent dandruff from forming, besides keeping the scalp healthy and cool.

3. Take a thimbleful of powdered refined borax, let it dissolve in a teacupful of water, first brush the head well, then wet a brush and apply it to the head. Do this every day for a week, and twice a week for a few times, and you will effectually remove the dandruff.

To Kill Horse and Sheep Sorrel. This field pest may be eradicated by the judicious application of either lime or ashes. The souring principle of sorrel is oxalic acid; if this be removed from the soil, sorrel can not grow. Lime or potash unites with the oxalic acid, forming oxalite of lime or potash. These substances are sometimes called sweeteners of the soil, from their ability to remove acids from it. Sorrel will never grow on lime soil.

Proud Flesh. 1. To remove proud flesh put a little alum on the stove and let it melt and boil. As soon as it thoroughly dries, pulverize and put the powder on the part affected.

2. Pulverize loaf-sugar and apply the same as the "burnt" alum.

Insects in the Ear. Let the person lay his head upon a table, the side upwards that has the ear in which is the insect; at the same time let some friend carefully drop into the ear a little sweet oil, or oil of almonds. A drop or two will be sufficient. This will instantly destroy the insect and remove the pain. Then syringe with warm water.

To Extract Splinters. Thorns and splinters finding their way under the skin frequently give very severe pain, and unless removed the annoyance may be very great, as inflammation will in all probability set in, which is the process nature adopts for getting rid of the cause of irritation. If the splinter or thorn can not be immediately removed (for which purpose a needle will be found in most cases a sufficient surgical

instrument,) linen dipped in hot-water should be bound round the place, or the part bathed in hot water. If inflammation sets in and produces an ulcer, hot water should be applied, and afterwards a flaxseed poultice.

To Make Your Umbrella Last. Most persons, when they come in from the rain, stand their umbrellas with the handle upward. They should put it downward; because when the handle is upward the water runs down inside to the place where the ribs are joined to the handle, and can not get out, but stays rotting the cloth and rusting the metal until slowly dried away. The wire securing the ribs soon rusts and breaks. If placed the other end up, the water readily runs off, and the umbrella dries almost immediately.

Don't Turn Down the Lamp. Many people who use kerosene oil are in the habit of burning night-lamps, and turning them down as they would gas, not knowing how much mischief they thus do. When the light of the kerosene lamp is turned down low, the combustion is not perfect, and the atmosphere of the room becomes filled by gas produced by partial combustion, and also little particles of smoke and soot thrown off, which are taken into the lungs of the occupants. Air thus poisoned is deadly in its effects, and it is injurious to breathe it. Its consequences are the mysterious headaches, sore throats and lungs, dizziness and nausea.

To Split Wood. In splitting wood that has been sawed into pieces it is much easier to split by slabs than to try and split them through the centre. This means to split off pieces at a time, but a little from the edge. Wood splits more readily in the direction up from the roots of the tree, than when the blow of the ax is downward. In other words, to split a chunk place it upside down, (contrary to the direction in which it grew) before striking at it.

Mildew in Wheat. Dissolve three ounces and two drams of sulphate of copper, or blue vitriol, in four gallons of cold water, for every three bushels that is to be prepared. Into another vessel capable of containing from fifty to seventy gallons, throw from three to four bushels of wheat, into which the prepared liquid is poured, until it rises five or six inches above the grain. Stir it thoroughly and carefully remove all that swims on the surface. After it has remained half an hour in the preparation, throw the wheat into a basket that will allow the water to escape, but not the grain. It ought then to be immediately washed in rain, or pure water, to prevent any risk of its injuring the

germ, and afterwards the seed ought to be dried before it is put in the ground. It may be preserved in this shape for months.

Lime Deposits in Boilers. Put into the cistern or tank, from which the boiler is fed, a sufficient amount of oak tan-bark, in the piece, to color the water rather dark; run four weeks and renew. This plan is much used, in the lime-stone sections of Ohio, giving general satisfaction.

Sprained Ankle. Wash the ankle frequently with cold salt and water, which is far better than warm vinegar or decoctions of herbs. Keep the foot as cold as possible to prevent inflammation, and sit with it elevated on a cushion. Live on very low diet, and take every day some cooling medicine.

To Make Drying Oil. A good drying linseed oil, prepared without the usual process of boiling. Mix with old linseed oil, the older you can get it the better, two per cent. of its weight of maganese borate, and heat this mixture on a water-bath, or, if you have to work with large quantities, with a steam-bath to 100° F., or at most 110° F.; you thus obtain a very excellent, light-colored, rapidly-drying oil; by keeping the mixture stirred, the drying property of the oil is greatly promoted. The rapidity of the drying of the oil after it has been mixed with paint, does not simply depend upon the drying property of the oil, but, in a very great measure, upon the state of the atmosphere—viz., whether dry or moist, hot or cold; the direct action of sunlight, and the state of the surfaces on which the paint is put. Really genuine boiled linseed oil, if well prepared, leaves nothing to be desired as regards rapidity of drying, but it is retarded by various substances which are added in practice, among which, especially, oil of turpentine is injurious.

Kerosene as Paint. This can be used to great advantage on a farm as a preserver of wood. It is not properly a paint. No coloring matter should ever be mixed with it. Ordinary linseed oil paint preserves wood by forming a coat that excludes the atmosphere from the pores. Kerosene penetrates the wood and excludes the air by filling up the pores.

Old barns from which the paint is worn will be much improved by a liberal coat of petroleum. It can be put on with a whitewash brush. The point is to get on as much as the wood will absorb. It is better to go over the work rapidly and then the next day go over it again. For shingle roofs, new or old, nothing is better than kerosene. In making a new roof dip the shingles by the bunch in petroleum until saturated.

FRUIT CULTURE.

Directions For Budding and Grafting.

DESCRIPTION AND HABITS OF THE INSECTS INJURIOUS TO FRUIT AND HOW TO DESTROY THEM.

FRUITS of all kinds are now raised for pleasure and profit, upon the large areas of land as well as in the small garden. There is nothing that better rewards the patient, careful, industrious, person, for the time and labor spent therein in caring for a large or small quantity of fruit bearing plants or trees.

A knowledge of how to bud or graft is often desirable. If a neighbor or friend has some very choice variety of fruit and you take a fancy that you want to add that variety to your stock, through his kindness of giving you a few buds or grafts, you can change a tree bearing an undesirable variety to a more desirable one, and it will bear fruit in much less time than would a young tree procured of a nurseryman.

It is only necessary to be handy with tools and careful and painstaking to be able to succeed at ordinary budding and grafting. A little practice and study will enable even the man of moderate intelligence to make a success of this work, thereby saving many dollars as well as improving the fruit upon his farm or garden.

Then while walking about the garden or farm, there is seen numerous bugs, flies, caterpillars, and various winged insects and if one was acquainted with their habits he could know if it was an enemy to his fruit garden or orchard. Through the kindness of the Department of Agriculture we have been enabled to give illustrations of many of the common enemies, and the best remedies for destroying them.

Budding. This consists of separating a bud with its root, and a small portion of the bark and wood and inserting it under the bark of another. The selection must be made from the growth of the season in which the budding is done. In Maryland and Virginia or in the same latitude budding may be done in June, and the buds will make considerable growth, but as the north is approached the season for budding advances from the tenth of July to the fifteenth of September. Those varieties that mature their fruit early should be budded earlier than late varieties. The season for budding extends over a period of about eight months. Buds can not be kept in good condition much over ten days, and even to keep them that length of time it is necessary to strip the shoots (on which are the buds) of their leaves and wrap the shoots in a damp cloth or moss as soon as cut, and then keeping them in a cool cellar among damp sawdust.

The buds are found in the axils of the leaves, that is where the leaves are fastened to the stems, and to make budding a success there must in all cases be these conditions:

1. The buds must be perfectly developed.
2. The bark of the plant to be budded must be easily separated from its wood.

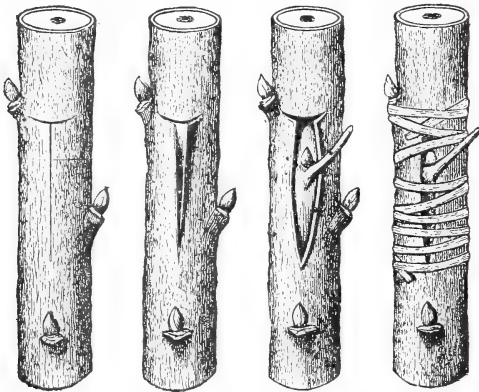
The bud is cut from the shoots by commencing to cut the bark about one-half inch above the bud to be removed,

and cutting just deep enough to take a little of the wood with the bud, so as to carefully preserve the root of the bud, for if the root is destroyed, the bud is useless.

The manner of cutting and preparing the stock for the reception of the bud is fully shown in the illustrations on this page.



FRUIT AND
WOOD BUDS.



THE INSERTION OF THE BUD.

Select a smooth place on the stock to be budded, that is free from branches, and make two cuts, one across the branch, and the other commencing in the centre of the cross-cut, and running down the branch, forming a T. Carefully raise the bark on the upper corners of the cut running up and down the branch as shown in the illustration. For this do not use the cutting edge of the knife, but the smooth ivory handle of the pruning knife which is prepared for that purpose. Cut this bud square off at the top so as to fit the "cross-cut" and put in the bud as represented. Basswood fibres, or strips of corn-husks should be used to tie up the loose bark, leaving the bud and leaf-stalk uncovered.

Grafting. This the most common way of producing a new variety

of fruit upon a full or well grown tree. The method most commonly used is to saw off a limb, split it through the centre, and at the outside edge so place a wedge shaped scion, containing buds, that the inside edges of the bark will be in communication with each other. The inside edges of the bark must at some point meet, and to insure a juncture the scions are oftentimes slanted out a little, thereby insuring union at one point at least. Care must be taken not to have the wedged shaped scion pinched too hard by the limb into which it has been placed.

A wedge if necessary should be placed in the centre. Cover the cleft with grafting wax and all is ready for growth of new stock. On

very small limbs it is often desirable to place only one scion, which may

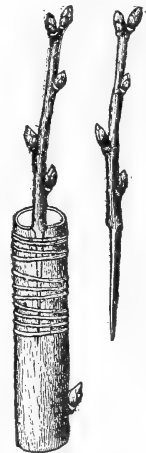
be done as represented in the drawing, and binding it with narrow bands of corn husks or wax. (A good grafting wax is made of four ounces of tallow, two ounces of beeswax, and two ounces of beef tallow).

The grafts may be cut any time in the mild weather of winter, and kept in moist sand in a cool place till needed.

It is not well to attempt to graft a whole tree at once, as the pruning would be too severe. Only graft about one-third of the branches each year.



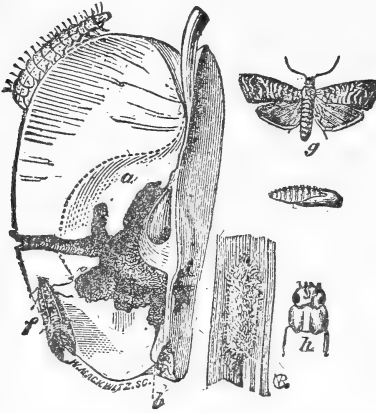
GRAFTING WITH
TWO SCIONS.



ONE SCION.

INSECTS INJURIOUS TO PLANTS.

The Coddling Moth. This annoying insect is found in nearly all parts of the United States and Canada. The moths appear on the wing about the time that apple trees are in blossom, when the female moth deposits her tiny yellow eggs on the calyx or eye of the blossom, just as the young apple is forming. It takes only a week for it to hatch, and immediately the little worm, beginning at the end opposite the stem, eats through the apple to the core.

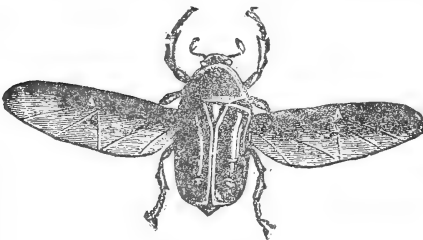


THE CODDLING MOTH.

- a. Burrowings.
- b. Point of entrance.
- f. Moth with wings closed.
- g. Moth with wings extended.
- h. Head of worm.
- Full grown worm on the apple.

There are two methods for reducing the numbers of these worms. One is to keep a drove of hogs in the orchard. They will eat the fruit as soon as dropped, and the worm is destroyed. Another and more effective remedy is to place cloths about ten inches wide around the trunks of the trees, about six inches above the ground. These cloths should be examined every few days and the larvae (worms) destroyed by pressure or dipping the cloths in hot water. Fasten the cloths about the trunk so that the upper edge is very tight around the tree and the lower edge hanging somewhat loose. This will give the worm a place to crawl under and form into a chrysalis.

Rose Beetle. This insect is commonly known as the rose-bug,

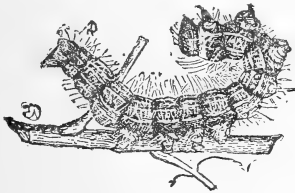


ROSE BUG.

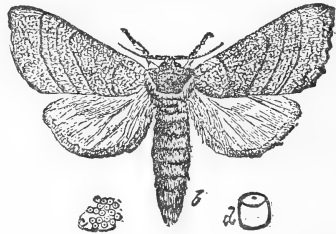
but has of late years developed an appetite for other plants besides the rose. It is very injurious to the grape-vine, the apple, the plum, the peach, and the cherry. As they are naturally sluggish, they can be gathered early in the morning, when appearing in large numbers, by

placing sheets on the ground and shaking the vine or tree. They must be put in boiling water, or placed in a keg and kerosene poured over them, the keg covered so they can not get out, and then set on fire. These pests make their appearance about the second week in June, the usual time for the blossoming of the rose.

The Tent Caterpillar. This insect needs no description, since it is so familiar to every one who ever has owned an orchard, or even a single tree. The perfect insect is a night-flying moth, or miller, and while they are specially fond of the black cherry, they will feed upon the apple, plum, and various forest trees. They usually appear during April or May, according to the tempera-



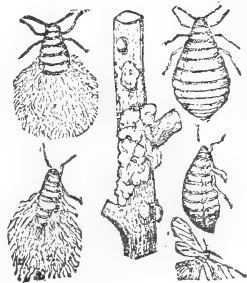
APPLE TREE
CATERPILLAR.



APPLE TREE MOTH.

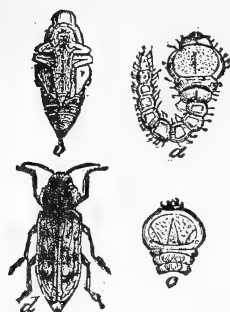
ture, and are conspicuous on account of their nest. The eggs may be found in great clusters on the twigs during the winter and early spring, and should be cut off and burned. The nest should be destroyed early in the morning or late at evening, while the worms are nearly all in. As the remaining worms which are not destroyed or out on a foraging tour, will repair the nest, repeated removals are necessary. Do not permit a fragment of a nest to remain.

Woolly Louse of the Apple. This insect attacks the trunk and limbs of the apple tree and covers itself with a cotton-like covering. The best way to get rid of these insects is to wash the trunk and limbs with soft soap which has been reduced till as thick as paint by the addition of sal-soda water. Another remedy is to mix in each two gallons of water necessary, two pounds of fresh lime and one-quarter pound of sulphur. After the lice are destroyed cut away all suckers that are growing at the base of the tree, and also remove the earth and clean thoroughly the trunk of the tree below the surface; then put fresh earth about the roots.



WOOLLY LICE.

Flat Headed Apple Tree Borer.



FLAT HEADED BORER.

a. Larva; b. Chrysalis; c. Portion of body; d. Perfect insect.

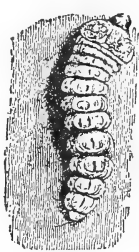
This beetle is of a greenish-black color, with brassy lines above, and shines like burnished copper below. It is about one inch in length, but the worm (larvae) which does all the damage, is much smaller. The grub, which has a very broad, flat head, also attacks the pear, plum, and peach, as well as the apple. As a preventive use the soft-soap treatment recommended for the "Woolly Louse." As it is often found on the larger limbs, the soft-soap should not be confined to the trunk, but should extend to the larger limbs.

Round Headed Apple Tree Borer.

The mature insect is nearly one inch long, and has two stripes running lengthwise of its body, separating three of a cinnamon-brown color. The insect flies only at night, hence is seldom seen. It makes its appearance in May, and lays its eggs in June, nearly at the foot of the tree, and the young worms soon bore into the bark.



Larva.



Chrysalis.



Beetle.

To remove and destroy this pest of the orchards; just before vegetation starts in the spring level the ground, and pack it firmly around the root of the tree, in a circle of about two feet in diameter, according to the size

of the tree. Take unleached ashes and air-slacked lime in equal parts, well mixed, and apply to the circle thus made, covering the ground all over two or three inches in depth. Then take strong soap suds, or, what is better, a solution of half a pound of sal-soda to one gallon of water, mixed with soft-soap, and paint the entire trunk and base of the limbs thoroughly with this mixture. Repeat this operation in the fall of the year, just before freezing weather, covering the ground with the mixture of ashes and lime, and washing the trunk and the base of the branches with the solution as above. If the borers have already made an entrance into the tree, the only way to get rid of them is to dig them out by the use of a fine,

annealed wire, avoiding as much as possible the cutting away of the bark in the necessary preparation for entering the holes.

The American Procris. This destructive insect feeds on vines in great flocks. When very young the little caterpillars eat only of the tissues of the leaf, as shown in the illustration, but as they grow older and gain strength they devour all of the leaf excepting the stems. They acquire their full growth about the first of August. They can be destroyed by sprinkling the leaves with London Purple diluted in water, or Paris-green mixed with plaster. White hellebore mixed with water, a tablespoonful to two gallons is also effective.



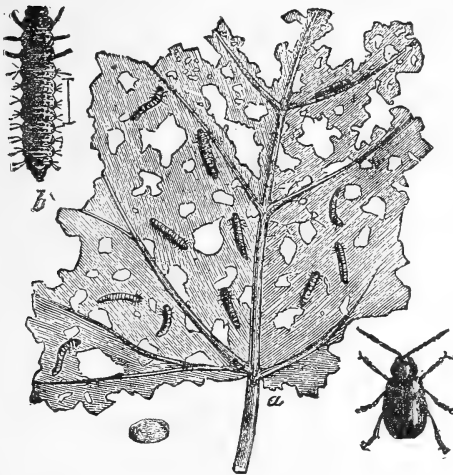
THE AMERICAN PROCRI.

Grape Vine Culture. In some parts of the country this is one of

the most destructive of the enemies of the grape vine. Both the beetle and the larvæ are great eaters of the grape leaf.

The eggs are usually laid on the wild grape, and the perfect insect, the beetle, is the only one found in the vineyard.

To destroy these beetles it is only necessary to spread under the vines strips of muslin wet with kerosene. Shake the vines and the beetles, falling upon the cloth wet with kerosene, will die instantly. Keep the cloths well saturated with the oil. It seems to be the odor from this simple remedy that kills these beetles.



LEAF ATTACKED BY THE GRAPE-VINE FLEA-BEETLE.

a. Larvæ on leaf; b. Larva enlarged; c. Beetle.

Grape-Vine Bark Louse. There is often found on the branches of the grape vine during the month of June, brown scales under one end of which there is seen a cotton like substance protruding, which grows in size for a couple of weeks until this cotton-like substance is some five times the size of the scale. These scales are usually found in great abundance and will shortly let out innumerable hosts of lice. These scales should be removed by scraping them off with a knife before the young lice have a chance to hatch and escape.



GRAPE VINE
BARK LOUSE.

Plum Curculio. To annihilate curculio, make a very strong solution of gas-tar and water, so that after standing a couple of days it will be dark-colored, and as pungent as creosote. On the first appearance of the curculio, with a small hand-forcing pump (which every gardener ought to have) give the trees an effectual drenching, and repeat it every three days for two weeks. As a preventive measure, destroy all the fruit as it falls, and this can best be done by allowing your fowls free range from the orchard.

Canker Worm. The canker worm, also called the measuring worm, is about one inch in length when full grown, and varies in color from light green to a light brown. It attacks the leaves of the apple and other trees, of which it is a great eater. The worms usually hatch about the time the young leaves are coming out from the bud. The female insect has to crawl up the tree to lay her eggs, as she is without wings, and she can be prevented from going up the tree by putting a cloth covered with tar around the tree, near its base, in the very early spring. It is best to put them on in October, and keep them on till the leaves are full grown in the spring.



CANKER
WORM.

Peach Borer. The best method used to destroy this pest is to bank up to the height of from eight to ten inches, adding a little each successive spring. This will prevent the depredations of the peach borer. Another is the use of scalding water. Early each spring scrape around the trees with a large knife on the morning of "washing day." When the washing is done, take buckets full of boiling suds into the orchard, and dash the trees just where the trunks join the ground. In

this way many thousands of these little worms are scalded to death.

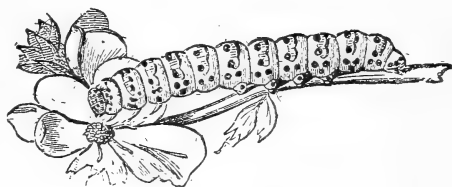
Currant Worms. There are two varieties of the currant worm, one of them native and the other imported. Both worms originally were found almost entirely upon the gooseberry, but now attack the currant and gooseberry alike. Our cut shows the larvae at work.



IMPORTED CURRANT WORM
AT WORK.

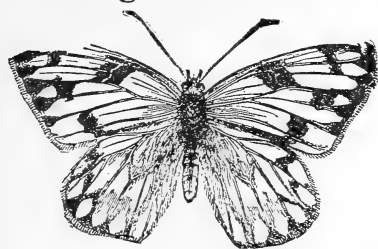
pot greatly diminishes them in number, and the second will almost complete the job. The perfect insect in both the native and imported varieties are sawflies. Wood ashes have been applied to the bushes when the dew was on, but while it destroys the worm, it also injures the leaves and the growing fruit.

There is an effectual remedy for these worms in the powder of white helebore. This powder is of a light greenish-yellow, and should be mixed with water in the proportion of an ounce to a pailful of water, and sprinkled freely on the vines. One application by means of the ordinary sprinkling



IMPORTED CURRANT WORM.

Cabbage Worm. This is in many parts of the country a great pest to the cabbage grower. The butterflies resemble the common yellow butterfly very much and appears about the last of May or the beginning of June. The butterfly deposits its eggs on the under side of the cabbage leaves three or four in a place. The eggs are about one-sixteenth of an inch in length, larger at one end than at the other, and yellowish in color.



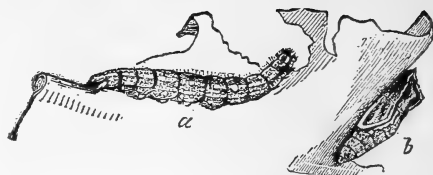
CABBAGE BUTTERFLY.

In about ten days after the eggs are laid; there appears greenish worms which are great feeders.

The butterflies are lazy and can be easily trapped with a hand net.

Every one caught reduces the number of eggs. Chickens and turkeys if allowed to remain in the cabbage lot will devour many of the worms.

These worms soon form into chrysalids to emerge as butterflies to lay eggs for a second crop of worms. This second crop can be avoided by putting boards, setting them on edge, between the rows, and the worms will attach themselves to the boards and turn into chrysalids. These can then be gathered and destroyed.



CABBAGE WORM.

a. Larva; b. Chrysalis.

THE LATEST INSECT DESTROYERS.

Bordeaux Mixture. This is the celebrated mixture which is coming into general use among fruit growers :

*6 pounds Copper Carbonate.
4 pounds Quicklime.
40-50 gallons Water.

Dissolve the copper sulphate by putting it in a bag of coarse cloth and hanging this in a vessel holding at least four gallons, so that it is just covered by the water. Use an earthen or WOODEN VESSEL. Slack the lime in an equal amount of water. Then mix the two and add enough water to make forty gallons. It is then ready for immediate use but will keep indefinitely. If the mixture is to be used on peach foliage it is advisable to add an extra pound of lime to the above formula. When applied to such plants as carnations or cabbages it will adhere better if about a pound of hard soap be dissolved in hot water and added to the mixture. For rots, moulds, mildews, and all fungus diseases.

Ammoniacal Copper Carbonate. This is used for the same purpose as the Bordeaux mixture.

*1 ounce Copper Carbonate.
Ammonia Carbonate enough to dissolve the copper.
9 gallons Water.

The copper sulphate is best dissolved in large bottles, where it will keep indefinitely, and it should be diluted with water as required.

London Purple. This is used in the same proportion as Paris green, but as it is more caustic it should be applied with two or three

*See page 446 — How to make Copper Carbonate.

times its weight of lime, or with the Bordeaux mixture. The composition of London purple is exceedingly variable, and unless good reasons exist for supposing that it contains as much arsenic as Paris green, use the latter poison. Do not use the London purple on peach or plum trees unless considerable lime is added. For insects which chew.

Copper Sulphate Solution. This is specially useful for fungus diseases.

1 pound Copper Sulphate.
15 gallons Water.

Dissolve the copper sulphate in the water, when it is ready for use. THIS SHOULD NEVER BE APPLIED TO FOLIAGE, BUT MUST BE USED BEFORE THE BUDS BREAK. For peaches and nectarines use twenty-five gallons of water.

Paris Green. This is principally used for insects which chew.

1 pound Paris Green,
200-300 gallons Water.

If this mixture is to be used upon peach trees, one pound of quick-lime should be added. PARIS GREEN AND BORDEAUX MIXTURE CAN BE APPLIED WITH PERFECT SAFETY. The action of neither is weakened, and the Paris green loses all caustic properties.

White Hellebore. This poison is not so energetic as the arsenites and may be used a short time before the sprayed portions mature. For insects which chew.

1 ounce Fresh White Hellebore.
3 gallons Water.

Apply when thoroughly mixed.

Kerosene Emulsion. Kerosene and water are very hard to mix. This mixture should be churned frequently while using.

$\frac{1}{2}$ pound Hard Soap,
1 gallon Boiling Water,
2 gallons Kerosene.

Dissolve the soap in the water, add the kerosene, and churn with a pump for five or ten minutes. Dilute ten to twenty-five times before applying. Use strong emulsion for all scale insects. For insects which suck, as plant lice, measly bugs, red spider, thrips, bark-lice, or scale. Cabbage worms, currant worms and all insects which have soft bodies, can also be successfully treated.

Cucumber Beetle. This beetle may usually be prevented by dusting the plants with plaster of Paris and Paris-green.

Concise Directions For Spraying Cultivated Plants.

∴ APPLICATIONS. ∴

PLANT.	FIRST.	SECOND.
APPLE. (Scab, codlin moth, bud moth).	When buds are swelling, copper sulphate solution.	*Just before blossom opens, Bordeaux. For bud moth, Arsenites when leaf buds open.
BEAN. (Anthracnose).	*When third leaf expands, Bordeaux.	*Ten days later, Bordeaux.
CABBAGE. (Worms, aphs).	*When worms or aphs are first seen, Kerosene emulsion.	*Seven to ten days later, if not heading re-new emulsion.
CARNATION. (Rust and other fungus diseases, red spider).	*When rust is first noticed, Bordeaux, Kerosene emulsion, when red spider is first seen.	*For rust repeat first in ten to fourteen days. For red spider repeat.
CHERRY. (Rot, aphs, slug).	As buds are breaking, Bordeaux; when aphs appears, kerosene emulsion.	When fruit has set, Bordeaux. For slugs dust leaves with air-slack'd lime Hellebore.
CURRANT. (Mildew, worms).	*At first sign of worms, arsenites.	*Ten days later, hellebore. If leaves mildew, Bordeaux.
GOOSEBERRY. (Mildew, worms).	*When leaves expand, Bordeaux. For worms as above.	*Ten to fourteen days later, Bordeaux. For worms as above.
GRAPE. (Fungus diseases, Flea Beetle.)	In spring when buds swell, copper sulphate solution. Paris-green for flea beetle.	*When leaves are one inch in diameter Bordeaux. Paris-green for larvæ of flea beetle.

Concise Directions For Spraying Cultivated Plants.

∴ APPLICATIONS. ∴

THIRD.	FOURTH.	FIFTH.	SIXTH.
*When blossoms have fallen, Bordeaux and arsenites.	*Eight to twelve days later, Bordeaux and arsenites.	Ten to fourteen days later, Bordeaux.	Ten to fourteen days later, Bordeaux
Fourteen days later, Bordeaux.	Fourteen days later, Bordeaux.		
*Seven to ten day later, if heading, hot water.	Repeat third in ten to fourteen days if necessary.	(When plants are small use arsenites for worms.	
Repeat 2d. using am. carbonate copper if in bloom	Repeat second as before if necessary.		
Ten to fourteen if rot appears, Bordeaux.	Ten to fourteen days later, Ammonical copper carbonate.		
If worms persist, Hellebore.			
*Ten days later am. copper carbonate. Hellebore.	*Ten to fourteen days later, repeat third.		
*When flowers open, Bordeaux. Paris-green.	*Ten to fourteen days later, Bordeaux.	Ten to fourteen days later, if any disease appears, Bordeaux.	Twelve days ammonical copper carbonate. Make later applications.

Concise Directions For Spraying Cultivated Plants.

∴ APPLICATIONS. ∴

PLANT.	FIRST.	SECOND.
NURSERY STOCK. (Fungus Diseases).	*When first leaves appear, Bordeaux.	*Ten to fourteen days, repeat first.
PEACH, NECTARINE, APRICOT. (Rot, Mildew).	*Before buds swell, copper sulphate solution.	Before flowers open, Bordeaux.
PEAR. (Leaf blight, scab, psylla codlin moth.	As buds are swelling copper sulphate solution.	*Just before blossoms open, Bordeaux. Kerosene emulsion when leaves open for psylla.
PLUM. (Fungus diseases, curculio.	*During first warm days of early spring, Bordeaux for black knot. When leaves are off in the fall. Kerosene emulsion for plum scale.	*When buds are swelling, Bordeaux for black knot and other fungus disease. Mid-winter, kerosene emulsion for plum scale.
POTATO. (Scab, blight, beetles.	*Soak seed for scab in corrosive sublimate (2 oz. to 16 gals. water) for 90 minutes.	*When beetles first appear, arsenites.
QUINCE. (Leaf and fruit spot).	When blossom buds appear, Bordeaux.	When fruit has set, Bordeaux and arsenites.
RASPBERRY, DEWBERRY, BLACKBERRY. (Anthracnose, rust).	Before buds break, copper sulphate solution. Cut out badly diseased canes.	During summer, if rust appears on leaves, Bordeaux.

Concise Directions For Spraying Cultivated Plants.

∴ APPLICATIONS. ∴			
THIRD.	FOURTH.	FIFTH.	SIXTH.
Ten to fourteen days, repeat first.	Ten to fourteen days repeat first.	Ten to fourteen days, repeat first.	Ten to fourteen days, repeat first.
*When fruit has set, Bordeaux	*When fruit nearly grown, am cop'r carbonate.	*Five to ten days later repeat fourth.	Five to ten days later repeat fourth if necessary.
*After blossoms have fallen, Bordeaux and Arsenites. Kerosene emulsion if necessary.	*Eight to twelve days later, repeat third.	Ten to fourteen days later Bordeaux. Kerosene emulsion applied forcibly for psylla	Ten to fourteen days later, repeat if necessary.
*When blossoms have fallen, Bordeaux. Begin to jar trees for curculio. Before buds start, kerosene emulsion for plum scale.	*10 days later, Bordeaux. Jar trees for curculio every two to four days.	*Ten to twenty days later, Bordeaux for black knot. Jar trees for curculio.	*Ten to twenty days later, Bordeaux for black knot. Later applications to prevent leaf spot and fruit rot, am. copper carbonate.
*When vines are two-thirds grown, Bordeaux and arsenites.	Ten to fifteen days later, repeat third.	Ten to fifteen days later Bordeaux if necessary.	
Ten to twenty days later, Bordeaux.	*Ten to twenty days later, Bordeaux.	*Ten to twenty days later, Bordeaux.	
Repeat second if necessary.	*(Orange rust is best treated by destroying the affected plants.		

How and When to Spray. Farmers and fruit growers are in need of short and concise directions for applying sprays to cultivated plants. Although much has been written on the subject of spraying, the information is so scattered that unless the farmers had hours to spend to find the desired knowledge, it could not be obtained. In the preparation of this table, there has been gathered most important points regarding sprays, and these have been arranged in such a manner that the grower can see at a glance what to apply and when to make the applications. The more important insect and fungus enemies are also mentioned, so that a fairly clear understanding of the work can be obtained by examining the foregoing table. When making the applications advised, other enemies than those mentioned are also kept under control. The directions given have been carefully compiled from the latest results obtained by leading horticulturists and entomologists, and they may be followed with safety.

NOTE.—In this it will be seen that some applications are preceded by a *, and these are the ones which are MOST IMPORTANT. The number of applications given in each case has particular reference to localities in which fungus and insect enemies are most abundant. If your crops are not troubled when some applications are advised, it is unnecessary to make any.

Aphis, the Hop-yard Pest. The best preventive is the destruction of its eggs on plum trees and of all wild plum trees in hop districts. The best remedies for attack are found in kerosene emulsion or fish-oil soaps.

The Currant Aphis. The best way to destroy the plant-lice that cluster on the tips of currant or gooseberry stems is by dipping the stems in, or spraying them with, pyrethrum or tobacco water. This will kill most of them. All may be destroyed by a strong kerosene emulsion as also its eggs in the autumn or winter if they are deposited on the stems. Undiluted kerosene may perhaps be used with safety.

Hop Louse. The best known remedies, are spraying the vines on the first appearance of the insect with the kerosene and soap emulsion, or the quassia and soap wash. By the proper use of the above means, serious losses may be averted.

Yellow Woolly Bear. This is a caterpillar attacking many garden plants, and is known in the winged state as "the white miller." They should be picked from the plants and crushed.

BOVINE TUBERCULOSIS.

To attack tuberculosis as it exists at present is undoubtedly a most difficult problem, and the conditions which tend to repress or to augment its further dissemination are very complex. No single measure, however sweeping, is likely to be successful. A number of details will have to receive careful attention, and in the end the success will depend largely upon the intelligent watchfulness constantly exercised in various directions by the stock owner. The wide dissemination and the localized intensity of this disease, especially in herds devoted to breeding purposes, will require, above all, concerted action in attempts for its repression.

Though a strictly bacterial disease and introduced into the body only by the tubercle bacillus, which is always derived from some pre-existing case of disease, tuberculosis differs, nevertheless, from most animal diseases in very important particulars. Its unknown beginnings in the body and its insidious march after it has once gained a foothold are responsible for the existence of a large number of tuberculosis animals in all stages of the disease. In the earlier stages, while the disease is still restricted to a single focus, the animal is to all outward appearances in perfect health. It is only after the infection has invaded several cavities of the body or produced mechanical obstructions that it becomes manifest. Hence it is difficult for the ordinary stock owner to diagnose and recognize the disease.

The tuberculin test is used by veterinarians but it requires the ability of an expert to determine the result. Hence the stockman should never rely on his own ability.

The stock owner should carefully and promptly remove from his herd and have examined by competent authority:

(1) All animals which show emaciation, with coughing, and any suspicious discharges from the nose.

(2) Those animals with enlarged, prominent glands about the head (in front of the ears, under and behind the lower jaw), or enlarged glands in front of the shoulder, in the flank, and behind the udder, and all animals having swellings on any part of the body which discharge a yellowish matter and refuse to heal.

(3) Animals with suspected tuberculosis of uterus and udder.

Disinfection and other preventive measures.— Preventive measures of a general character must still be kept in view for some time after removal of animals affected. These measures partly suffer shipwreck from the fact that it is difficult without tuberculin to recognize even advanced disease during life. Still much can be done to reduce the amount of infection by following out certain general and specific suggestions which the renewed study of the disease has either originated or else placed on a more substantial basis.

Perhaps the most important preliminary suggestion to be made is, that the owner of cattle should endeavor to familiarize himself as much as possible with the general nature of tuberculosis, its cause, the ways in which the virus may leave the body of the sick and enter that of the well, and, lastly, the ways in which it spreads within the body. He should make himself acquainted with the peculiar appearance of tuberculosis growths in the body, and open every animal that dies, so that he may know to what extent his animals are dying of this malady. Wherever possible the services of the skilled veterinarian should be made use of. Sanitary precautions should begin with the removal of diseased and suspected animals. This is the most essential requirement, for diseased animals are the only breeding places of the specific virus.

After the removal of these, attention should be paid first of all to the stables. Here, during the long confinement of the winter months, when ventilation is all but suppressed, we may look for the source of most of the inhalation diseases so common in tuberculous cattle. Even when only a few cases of tuberculosis have been found, the stables should be disinfected by removal of all dirt and the subsequent application of disinfectants. Since tubercle bacilli are more resistant than most other disease germs, the strength of the disinfecting solution must not be less than as given. The following substances may be used:

(a) Corrosive sublimate (mercuric chloride), 1 ounce in about 8 gallons of water (one-tenth of 1 per cent). The water should be kept in

wooden tubs or barrels and the sublimate added to it. The whole must be allowed to stand twenty-four hours, so as to give the sublimate an opportunity to become entirely dissolved. Since this solution is poisonous, it should be kept well covered and guarded. It may be applied with a broom or mop and used freely in all parts of the stable. Since it loses its virtue in proportion to the amount of dirt present, all manure and other dirt should be first removed and the stables well cleaned before applying the disinfectant. After it has been applied, the stable should be kept vacant as long as possible. Before animals are allowed to return, it is best to flush those parts which the animals may reach with their tongues, to remove any remaining poison.

(b) Chloride of lime, 5 ounces to a gallon of water (4 per cent). This should be applied in the same way.

(c) The following disinfectant is very serviceable. It is not so dangerous as mercuric chloride, but is quite corrosive, and care should be taken to protect the eyes and hands from accidental splashing:

Crude carbolic acid.....	$\frac{1}{2}$ gallon.
Crude sulphuric acid.....	$\frac{1}{2}$ gallon.

These two substances should be mixed in tubs or glass vessels. The sulphuric acid is very slowly added to the carbolic acid. During the mixing a large amount of heat is developed. The disinfecting power of the mixture is heightened if the amount of heat is kept down by placing the tub or glass demijohn containing the carbolic acid in cold water while the sulphuric acid is being added. The resulting mixture is added to water in the ratio of 1 to 20. One gallon of mixed acids will furnish twenty gallons of a strongly disinfectant solution having a slightly milky appearance.

(d) Whitewash is not of itself of sufficient strength to destroy tubercle bacilli, but by imprisoning and incrusting them on the walls of stables they are made harmless by prolonged drying. Whitewashing should be preceded by thorough cleaning.

The removal of virus from the stables should, furthermore, be promoted by the regular removal of manure and by abundant ventilation. Good air has the effect of diluting infected air, and thereby reducing the chance of inhaling dried, floating tubercle bacilli, or at least of reducing the number inhaled. It likewise improves the vigor of the confined animals, and hence increases the resistance to infection.

Cattle should not be placed so that their heads are close together; each animal should have plenty of room and occupy the same place in the stable at all times. These precautions will prevent the nasal, lung, or vaginal discharges from one animal striking the head or soiling the feed of another. It is true that it is impossible to prevent animals licking each other outside of the stable, but it should be remembered that prevention must begin with the removal of all cases which are suspected of discharging tubercle bacilli. *Stables should, furthermore, be carefully protected from the expectorations of human beings affected with (consumption) tuberculosis of the lungs.*

In endeavoring to comprehend the peculiar nature of this disease bear in mind that the virus, *i. e.*, the tubercle bacilli, do not live and multiply in the blood. They are simply carried in the blood, in advanced cases, from organ to organ, and speedily fixed in the tissues, where they produce fresh crops of tubercles. In the earlier stages, when single glands only are the seat of the disease, the blood is free from infection. This accounts for the immunity of the milk in these stages. If there were any method of distinguishing these cases the danger incident to the milk supply could be easily removed. In practice, however, no such distinction can be definitely made; hence the suspicion which rests on all milk which comes from infected herds.

Tuberculosis thus differs from other infectious diseases not so much in its nature as in the degree of its activity. It is a disease long drawn out, presenting stages, covering months and years, the duration of which in other more rapid diseases is measured by days.

THE CONTAGIOUSNESS OF THE DISEASE.

This is linked to the tubercle bacillus, for without it tuberculosis cannot develop. Hence our knowledge of the transmission of the disease is derived largely from what we know of the life history of the tubercle bacillus within and without the animal body. Tubercle bacilli may pass from diseased animals in the following ways:

- (1) In discharges coughed up, in the case of advanced disease of the lungs. When the glands of the throat are diseased, they may, after a time, break down and discharge into the throat. Other glands about the head and neck may discharge directly outward.
- (2) In discharges from bowels, in advanced stages.
- (3) In discharges from vagina, in case of tuberculosis of the uterus.
- (4) In milk, when the udder is tuberculous or the disease generalized.

(5) Tubercle bacilli may pass from the mother to the foetus in case of tuberculosis of the uterus or advanced generalized disease

Tubercle bacilli may be taken up by cattle in several different ways:

(1) Fully nine-tenths of all diseased animals examined have been infected by inhaling the tubercle bacilli, dried and suspended in the air.

(2) Fully one-half of all diseased animals examined have been infected by taking tubercle bacilli into the body with the food. This implies that both food and air infection are recognizable in the same animal in many cases.

(3) Animals are infected, though rarely, during copulation. In such cases the disease starts in the uterus and its lymph glands, or in the sexual organs and corresponding lymph glands of the bull.

(4) Perhaps from one to two per cent of all calves of advanced cases are born infected. Among the 200 cases of tuberculosis, including all ages, which have been examined by the writer, there are about two per cent in which the disease is best explained as having been directly transmitted from the mother during or before birth.

We may define the dangers of infection somewhat more definitely by the statement that in any herd, even in those extensively infected, only a small percentage of the diseased animals, namely, those which are in an advanced stage, or such as have the disease localized from the very beginning in the udder, or the uterus, or the lungs, are actively shedding tubercle bacilli. It is these that are doing most, if not all, of the damage by scattering broadcast the virus.

Disease of the udder is particularly dangerous, because the milk at first appears normal for some weeks, and therefore would be used with impunity. Moreover, the tubercle bacilli in the diseased gland tissue are usually numerous.

The condition of the milk in different stages of the disease is a question of great importance and demands careful consideration. The stock owner, in the absence of proper dairy or other official inspection, is under serious moral responsibilities to remove from his herd those animals in which there is even a suspicion of udder tuberculosis. Any udder which is found to increase slowly in size without any indication of inflammatory processes, recognizable by the presence of heat, pain, and redness, and which becomes very firm without showing at first any alteration in the appearance of the milk, should be regarded as infected, the cow promptly segregated, and the entire milk rejected until a diagnosis can be made by a veterinarian.

GRAIN SMUTS.

To the ordinary observer nothing could seem more unlike a definitely organized plant than the black, dusty mass filling the kernels of wheat or replacing an entire head of oats. Yet, as a matter of fact, the black dust is composed of thousands of germs of a minute parasitic plant. These germs, or spores, which have the same function as the seeds of higher plants, are blown about by the wind and lodge on the healthy kernels of the grain. When the kernel sprouts the spores adhering to it germinate and send a slender thread into the young plant. The slender threads of the parasite follow the growth of the plant, but their presence can scarcely be detected until the head begins to develop. The flower or grain is then filled by a mass of the threads, which absorb the nourishment intended for the grain and are soon converted into a mass of spores, again ready to fly about and infect next year's seed.

There are two classes of smuts which attack our common cereals, viz., the stinking smuts, which destroy only the kernel, and which have a pronounced disagreeable odor, and the loose smuts, which destroy not only the kernel but also more or less of the chaff, and which are more dusty and loose. The stinking smuts occur on wheat only, while the loose smuts are found on wheat, oats and barley. As the different smuts have to be treated differently, it is of advantage to the agriculturist to be able to recognize them readily. Wheat, for instance, is attacked by three species — two stinking smuts and one loose smut.

STINKING SMUTS OF WHEAT.

The two species are very similar and can usually be distinguished only by the aid of a microscope. The smutted kernels (usually all in the head are affected) are slightly larger and more irregular in shape than healthy grains, and are easily broken open, disclosing a dark-brown powder, which possesses a disagreeable penetrating odor.

Even a small per cent of smutted kernels will give a whole bin of wheat this characteristic odor. The stinking smuts are thus easily recognized if present in any considerable quantity in the thrashed grain. This is not true of any other grain smuts, however.

LOOSE SMUT OF WHEAT.

This is very different from the stinking smuts. It has no fetid odor; attacks both kernels and chaff; ripens when the healthy wheat is just flowering; and is composed of a loose, dusty mass of spores. These spores are usually entirely blown away by harvest time, leaving only the naked stalk where the head should be.

Loose smut is known to occur in many parts of the United States, though fortunately it is rare or entirely absent in many localities. It does not usually destroy so large a proportion of the crop as do the stinking smuts; still, it often causes a loss of ten per cent or more of the crop, and has even been reported as destroying over fifty per cent of a crop in Michigan.

Wheat growers should be on their guard against this enemy, and try to secure seed wheat from fields known by careful examination at flowering time to be free from loose smut. It can, however, be combatted by treating enough wheat to furnish seed for the following year, and this should be done when any considerable per cent of the crop is affected.

LOOSE SMUT OF OATS.

This smut is very similar in general appearance to the loose smut of wheat, and like that species it ripens when the grain is in flower, and is blown about by the wind. At harvest time the head is often entirely bare. There is, however, a form of this smut which destroys only the kernel and leaves the outer chaff unaffected. This is very hard to recognize, since the smutted heads look almost exactly like those of healthy plants, and can be detected only by cutting open the husks, when a mass of smut will be found in place of the kernel. Sometimes more than two-thirds of the smut is of this hidden form. This is likely to cause the grower to greatly underestimate the amount of smut.

By means of two newly discovered treatments of the seed, viz, with potassium sulphide, and with hot water, oat smut can be completely prevented at very little expense. Fortunately, both the common and hidden forms of smut can be eradicated with equal ease. It is certain

that oat growers could save many millions of dollars annually above all expenses by treating their seed oats.

SMUTS OF BARLEY, RYE AND CORN.

Barley is attacked by two loose smuts, both very similar to the loose smut of oats. In the covered barley smut the spores are often retained till harvest by a thin membrane, inclosing the smutted kernel and chaff. The naked barley smut, on the other hand, is like the ordinary form of oat smut, and is usually all blown away long before harvest. Both kinds of barley smuts can be completely prevented by the treatment recommended further on.

Rye smut attacks the leaves and stems of this cereal, and sometimes weakens the plants considerably. Jensen thinks it can be prevented by treating five minutes with hot water at 127 degrees F.

Corn smut is of widespread occurrence, but rarely causes more than a fraction of one per cent loss. No method of prevention is as yet known.

PRACTICAL DIRECTIONS FOR TREATING SEED FOR SMUT.

POTASSIUM SULPHIDE TREATMENT FOR OAT SMUT.

The potassium sulphide should be of the fused form known as "liver of sulphur." It can be obtained of any druggist for from twenty-five to fifty cents per pound, depending on the quantity purchased. It should be kept in a tight glass vessel, protected from the air, until ready for use. Dissolve one and one-half pounds in twenty-five gallons of water in a wooden vessel; a tight barrel is very good for the purpose. The lumps of potassium sulphide dissolve in a few minutes, making the liquid a clear yellowish-brown color. After thoroughly stirring, put in about three bushels of oats and agitate well to insure wetting every grain. The solution must completely cover the grain and be several inches above it, as the grain soaks up some of the liquid. Leave the oats in this solution twenty-four hours, stirring several times during the day to be sure every kernel is wetted. Then spread out to dry. In treating large quantities of seed, a hogshead or a wooden tank might be used. The solution should not be used more than three times. In no case should any metal be allowed to come in contact with the liquid. This treatment is thoroughly effective for oat smut, and is worthy of trial for stinking smut of wheat.

THE HOT-WATER TREATMENT FOR STINKING SMUT OF WHEAT AND OAT SMUT.

Provide two large vessels, preferably holding at least twenty gallons. Two wash kettles, soap kettles, wash boilers, tubs, or even barrels, will do. One of the vessels should contain warm water, say at 110 degrees to 120 degrees F., and the other scalding water, at 132 degrees to 133 degrees F. The first is for the purpose of warming the seed preparatory to dipping it into the second. Unless this precaution is taken it will be difficult to keep the water in the second vessel at the proper temperature. A pail of cold water should be at hand, and it is also necessary to have a kettle filled with boiling water from which to add from time to time to keep the temperature right. Where kettles are used a very small fire should be kept under the kettle of scalding water. The seed which is to be treated must be placed, half a bushel or more at a time, in a closed vessel that will allow free entrance and exit of water on all sides. For this purpose there can be used a bushel basket made of heavy wire, inside of which is spread wire netting, say twelve meshes to the inch; or an iron frame can be made at a trifling cost, over which the wire netting can be stretched. This will allow the water to pass freely and yet prevent the passage of the seed. A sack made of loosely woven material, as gunny sack, can be used instead of the wire basket. A perforated tin vessel is in some respects preferable to any of the above. In treating stinking smut of wheat, the grain should first be thrown into a vessel filled with cold water; then, after stirring well, skim off the smutted grains that float on top and put the grain into the basket or other vessel for treatment with hot water. This skimming is entirely unnecessary with other grains, and even with wheat when affected only by the loose smut. Now dip the basket of seed in the first vessel, containing water at 110 degrees to 120 degrees F.; after a moment lift it, and when the water has for the most part escaped, plunge it into the water again, repeating the operation several times. The object of the lifting and plunging, to which should be added also a rotary motion, is to bring every grain in contact with the hot water. Less than a minute is required for this preparatory treatment, after which plunge the basket of seed into the second vessel, containing water at 132 degrees to 133 degrees F. If the thermometer indicates that the temperature of the water is falling, pour in hot water from the kettle of boiling water until the right degree is attained. If the temperature should rise higher than 133

degrees, add a little cold water. In all cases the water should be well stirred whenever any of a different temperature is added. The basket of seed should very shortly after its immersion be lifted and drained, and then plunged and agitated in the manner described above. This operation should be repeated six or eight times during the immersion, which should be continued ten minutes. In this way every portion of the seed will be subjected to the action of the scalding water. In practice it will be found best to have a man or boy devote his whole time to keeping the temperature at the right point, adding a little hot water if it falls below 132 degrees and a little cold water if it gets above 133 degrees F. Another man should handle the grain and immerse and drain the portion being treated as directed above. After removing the grain from the scalding water, spread on a clean floor or piece of canvas to dry. The layer of grain should not be over three inches thick. If it cannot be spread out at once, dip in cold water and set to one side until it can be attended to. It dries better if spread while still hot. Another portion of grain can then be treated, and so on until all the seed has been disinfected. Directions for drying the seed will be given further on.

The important precautions to be taken are as follows: (1) Maintain the proper temperature of the water (132 degrees or 133 degrees F.), in no case allow it to rise higher than 135 degrees or fall below 130 degrees; (2) see that the volume of scalding water is much greater (at least six or eight times) than that of the seed treated at any one time; (3) never fill the basket or sack containing the seed entirely full, but always leave room for the grain to move about freely; (4) leave the seed in the second vessel of water ten minutes.

COPPER-SULPHATE TREATMENT FOR STINKING SMUT OF WHEAT.

This consists in immersing the seed wheat twelve hours in a solution made by dissolving one pound of commercial copper sulphate in twenty-four gallons of water, and then putting the seed for five or ten minutes into limewater made by slaking one pound of good lime in ten gallons of water. The treatment is cheap, easily applied, and very effective.

DRYING THE TREATED SEED.

All of the seed treatments leave the seed wet and necessitate drying before planting. The grain should be spread in a layer two or three inches deep, and should be shoveled over twice or three times a day.

MANURES.

MANURES.—It becomes a matter of the highest consequence to the farmer to understand, not only what substances may be useful as manures, but also how to apply them in the best manner to his crops so far as they may be made profitable.

HOME-MADE GUANO OF UNEQUALLED EXCELLENCE.—Save all your fowl manure from sun and rain. To prepare it for use, spread a layer of dry swamp muck (the blacker it is the better) on your barn floor, and dump on it the whole of your fowl manure; beat it into a fine powder with the back of your spade; this done, add hard wood ashes and plaster, (Gypsum) so that the compound shall be composed of the following proportions: Dried muck, three bushels; fowl manure, two bushels; ashes, one bushel; plaster, one and one-half bushels; mix thoroughly, and spare no labor; for in this matter the elbow grease expended will be well paid for. A little before planting moisten the heap with water, or, better still, with urine, cover well over with old mats and let it lie till wanted for use. Apply it to beans, corn, or potatoes at the rate of a handful to a hill, and mix with the soil before dropping the seed. This will be found the best substitute for guano ever invented, and may be depended on for bringing great crops of turnips, corn, potatoes, etc.

TO DISSOLVE LARGE BONES FOR MANURE WITHOUT EXPENSE.—Take any old flour-barrel, and put into the bottom a layer of hardwood ashes; put a layer of bones on the top of the ashes, filling the space between the bones with them; then add bones and ashes alternately, finishing off with a thick layer of ashes. When your barrel is filled, pour on water (urine is better), just sufficient to keep them wet, but do not on any account suffer it to leach one drop; for that would be like leaching your dungheap. In the course of time they will heat, and eventually soften down so that you can crumble them with your finger. When sufficiently softened, dump them out of the barrel on a heap of dry loam, and pulverize and crumble them up till they are completely

amalgamated into one homogeneous mass with the loam, so that it can be easily handled and distributed whenever required. You may rely on it, this manure will leave its mark, and show good results wherever it is used.

HOW TO DOUBLE THE USUAL QUANTITY OF MANURE ON A FARM.—Provide a good supply of black swamp mould or loam from the woods within easy reach of your stable, and place a layer of this, one foot thick, under each horse, with litter, as usual, on the top of the loam or mould. Remove the droppings of the animal every day, but let the loam remain for two weeks; then remove it, mixing it with other manure, and replace with fresh mould. By this simple means any farmer can double, not only the quantity, but also the quality, of his manure, and never feel himself one penny the poorer by the trouble or expense incurred, while the fertilizing value of the ingredients absorbed and saved by the loam can scarcely be estimated.

TWENTY DOLLARS' WORTH OF MANURE FOR ALMOST NOTHING.—If you have any dead animal, say, for instance, the body of a horse, do not suffer it to pollute the atmosphere by drawing it away to the woods, or any other out of the way place, but remove it a short distance only from your premises, and put down four or five loads of muck or sods, place the carcass thereon, sprinkle it over with quick-lime, and cover over immediately with sods or mould sufficient to make, with what had been previously added, twenty good wagon loads, and you will have within twelve months a pile of manure worth \$20 for any crop you choose to put it upon. Use a proportionate quantity of mould for smaller animals, but never less than twenty good wagon loads for a horse; and, if any dogs manifest too great a regard for the enclosed carcass, shoot them on the spot.

ASHES FROM SOIL BY SPONTANEOUS COMBUSTION.—Make your mound twenty-one feet long by ten and one-half feet wide. To fire use seventy-two bushels of lime. First a layer of dry sods or parings on which a quantity of lime is spread, mixing sods with it, then a covering of eight inches of sods, on which the other half of the lime is spread, and covered a foot thick, the height of the mound being about a yard. In twenty-four hours it will take fire. The lime should be fresh from the kiln. It is better to suffer it to ignite itself than to effect it by the operation of water. When the fire is fairly kindled, fresh sods must be applied, but get a good body of ashes in the first

place. I think it may be fairly supposed that the lime adds full its worth to the quality of the ashes, and when limestone can be got I would advise the burning a small quantity in the mounds, which would be an improvement to the ashes, and would help to keep the fire burning.

SUBSTITUTE FOR BARN MANURE.—Dissolve a bushel of salt in water enough to slack five or six bushels of lime. The best rule for preparing the compost heap is, one bushel of this lime to one load of swamp muck intimately mixed, though three bushels to five loads makes a very good manure. In laying up the heap let the layers of muck and lime be thin, so that decomposition may be more rapid and complete. When lime cannot be got, use unleached ashes, three or four bushels to a cord of muck. In a month or six weeks overhaul and work over the heap, when it will be ready for use. Sprinkle the salt water on the lime as the heap goes up.

Ashes may be pronounced the best of the saline manures. They are also among the most economical; as, from our free use of fuel, they are largely produced by almost every household. Good husbandry dictates that not a pound of ashes should be wasted, but all should be saved and applied to the land; and, where they can be procured at a reasonable price, they should be purchased for manure. Leached ashes, though less valuable, contain all the elements of the unleached, having been deprived only of a part of their potash and soda. They may be drilled into the soil with roots and grain, sown broadcast on meadows or pastures, or mixed with the muck heap. They improve all soils not already saturated with the principles which they contain.

The quantity of ashes that should be applied to the acre must depend on the soil and crops cultivated. Potatoes, turnips and all roots—clover, lucern, peas, beans and the grasses, are great exhausters of the salts, and they are consequently much benefited by ashes. They are used with decided advantage for the above crops in connection with bone dust; and for clover, peas and roots, their effects are much enhanced when mixed with gypsum. Light soils should have a smaller, and rich lands or clays, a heavier, dressing. From twelve to fifteen bushels per acre for the former, and thirty for the latter, is not too much; or, if they are leached, the quantity may be increased one-half, as they act with less energy. Repeated dressings of ashes, like those of lime and gypsum, without a corresponding addition of vegetable or barnyard manures, will eventually exhaust tillage lands.

OLD LIME PLASTER, FROM WALLS OF BUILDINGS, ETC.—For meadows, and for most other crops, especially on clays and loams, this is worth twice its weight in hay; as it will produce a large growth of grass for years in succession, without other manure. But the farmer cannot too carefully remember that with this, as with all other saline manures, but a part of the ingredients only is thus supplied to vegetables; and, without the addition of the others, the soil will sooner or later become exhausted.

SAVING BARN-YARD MANURE.—The bulk, solubility and peculiar tendency to fermentation of barnyard manure, renders it a matter of no little study so to arrange it as to preserve all its good qualities and apply it undiminished to the soil. A part of the droppings of the cattle are necessarily left in the pastures, or about the stacks where they are fed; though it is better, for various reasons, that they should never receive their food from the stack. The manure thus left in the fields should be beaten up and scattered with light, long-handled mallets, immediately after the grass starts in the spring, and again before the rains in the autumn. With these exceptions, and the slight waste which may occur in driving cattle to and from the pasture, all the manure should be dropped either in the stables or in the yards. These should be so arranged that cattle may pass from one directly into the other; and the yard should, if possible, be furnished with wells, cisterns, or running water. There is twice the value of manure wasted annually on some farms in sending the cattle abroad to water, that would be required to provide it for them in the yard for fifty years.

The premises where the manure is dropped should be kept as dry as possible; and the eaves should project several feet beyond the side of the building so as to protect the manure thrown out of the stables from the wash of rains. The barns and all the sheds should have eave-troughs to carry off the water, which, if saved in a sufficiently capacious cistern, would furnish a supply for the cattle. The form of the yard ought to be dishing toward the center, and, if on sandy or gravelly soil, it should be puddled or covered with clay to prevent the leaking and escape of the liquid manure. The floors of the stables may be so made as to permit the urine to fall on a properly prepared bed of turf under them, where it would be retained till removed; or it should be led off by troughs into the yard or to a muck heap.

VALUE OF LIQUID MANURES.—The urine voided from a single cow is considered in Flanders, where agricultural practice has reached a

high state of advancement, to be worth \$10 per year. It furnishes nine hundred pounds of solid matter, and, at the price of \$50 per ton, for which guano is frequently sold, the urine of a cow for one year is worth \$20. And yet economical farmers will waste urine and buy guano! The urine of a cow for a year will manure one and a quarter acres of land, and is more valuable than its dung, in the ratio by bulk, of seven to six; and in real value as two to one.

SOLID ANIMAL MANURES.—Of these horse dung is the richest and the easiest to decompose. If in heaps, fermentation will sometimes commence in twenty-four hours; and even in midwinter, if a large pile be accumulated, it will proceed with great rapidity; and, if not arrested, a few weeks, under favorable circumstances, are sufficient to reduce it to a small part of its original weight and value.

The manure of sheep is rich and very active, and, next to that of the horse, is the most subject to heat and decomposition. The manure of cattle and swine, being of a colder nature, may be thrown in with that of the horse and sheep in alternate layers. If fresh manure be intermixed with straw and other absorbents (vegetables, peat, turf, etc.), and constantly added, the recent coating will combine with any volatile matters which fermentation develops in the lower part of the mass. Frequent turning of the manures is a practice attended with no benefit, but with certainty of the escape of much of its valuable properties.

MANURING WITH GREEN CROPS.—This system has within a few years been extensively adopted in some of the older settled portions of the United States. The comparative cheapness of land and its products, the high price of labor, and the consequent expense of making artificial manures, renders this at present the most economical plan which can be pursued. The object of this practice is, primarily, fertilization; and connected with it, is the clearing of the ground from noxious weeds, as in fallows, by plowing in the vegetation before the seed is ripened; and finally to loosen the soil and place it in the mellowest condition for the crops which are to succeed. Its results have been entirely successful, when steadily pursued with a due consideration of the objects sought, and the means by which they are to be accomplished. Lands in many of our eastern States, which have been worn out by improvident cultivation, and unsalable, have, by this means, while renumerating their proprietors for the outlay of labor and expense by their returning crops, been doubled in value.

PRACTICAL DIRECTIONS FOR BOOK-KEEPING BY FARMERS.

Nearly every person keeps a memorandum of contracts made and the payments of money, but how many cultivators of the soil keep an account with each crop, to see if it is raised at a profit, or results in a loss.

The question of whether a crop has resulted in a profit can be easily figured, provided the entries are made when transpiring, and not left to become a question of memory.

Let us take for example a crop of corn. First determine the number of acres planted, and, at the estimated value of the farm, charge up as an expense against the corn crop the interest on the value of the land. Reckon the interest at the legal rate in the State where located.

Next, keep account of the number of days spent in putting the land in order, and place that on the debit side against your crop. Then charge the seed used, the fertilizers, the time spent in cultivating, the time occupied in gathering the crop, preparing for market, and delivering it. Then charge up an equitable amount of the taxes, and general wear on the tools and general decrease in value of the farmer's apparatus, and general expenses such as fencing, etc., etc. This will make up the sum total to be charged against the crop.

On the credit side should be placed the amount received from the proceeds of the sale of the product. Also credit the crop with whatever fodder, or other product left and used on the farm, as a fertilizer, or as fodder for cattle or other stock. If there has been a crop of pumpkins, squashes, or turnips raised among the corn, do not fail to give the land due credit for all that it produces.

In computing the value of the work done by the farm teams, it would be hardly fair to charge what the cartman might get for a single day's work, but by getting at the cost of keeping a team for a year, the natural depreciation in their value, together with a moderate charge for caring for the team and the cost of keeping shod and other expenses, and dividing this sum by the average number of days the team will work each year, the cost of a day's work by the team will be quite well established.

No special form of book is needed for such an account, and the method is simple. The farmer, stockman or fruit-raiser will be well repaid for his trouble and then feel he knows which one of his many crops yields him the best profit.

LEGAL DEPARTMENT.

Legal Facts of Importance to All.

PLAINLY STATED AND VERY EASILY UNDERSTOOD.

LAW has been defined as principles of right and justice governing the actions of men, and defining their different rights in relation to each other. The object of the law is to give every person the full enjoyment of these rights; thus protecting the weak and innocent from the unjust acts of dishonest people.

Law is divided into two classes, viz: that which has been established by long common practice, or usage and that which is specially passed by legislatures and is found upon the statute books. The former is called the Common or Unwritten Law, and is founded in justice and reason. The last or Statute Law is passed by our legislators and is called Written Law.

The value of a thorough understanding of the principles of law of general application is of great importance to every one who has business of any kind to transact. Those who possess this knowledge have a shield to protect them from the cunning and trickery of the world.

It is far better to be protected by knowledge from the tricks of the dishonest than to try to remedy an act, in which a dishonest person has taken advantage. Skelton says: "Whoever goes to law goes into a glass house, where he understands little or nothing of what he is doing; where he sees a small matter blown up, like a glass ball, into fifty times the size of its real contents, and through which if he can perceive any other

objects, he perceives them all discolored and distorted.”

The going to law is well illustrated by the story of two men who went to court about the ownership of a cow. The lawyers had the milk during the time of litigation, although the two men had to provide it ample provision, and at the end the court took the cow to pay the judge for the time he had lost in considering to whom the cow belonged.

Not every man can be a lawyer, yet every man can know enough law to do business in such a manner as to protect his interests. Let every contract be worded so that two meanings cannot be taken, have it properly signed in the presence of a witness who signs his name as witness, and there can be but little trouble.

It is useless to pay a lawyer or Justice to draw up an ordinary contract or bill of sale.

CONTRACTS.

What is a Contract? An agreement between two or more parties to do or not to do some specified thing is called a contract. It may be verbal, (by word of mouth) or written.

This subject is a limitless one, for scarcely a day passes without one making a contract. The simplest agreement one with another is a contract, and limitless as they are in number, and varied in their requirements; they are all governed by very general rules.

Contract Not Valid. An agreement to do a thing contrary to law, or a thing forbidden by law, can not be enforced. As for example; the law in the state of New York, directs every teacher in the public schools to attend an “Institute” once a year, and compels the district to pay for the time so spent. Any agreement contrary to the above law can not be enforced.

Things Necessary. There are certain things necessary, without which there can be no contract. First there must be parties to the contract, and they must be legally qualified; second, there must be a reasonable consideration; third, there must be the thing to be done or not to be done, (subject matter); fourth, there must be the consent of all parties to the agreement; fifth there must be a time when the contract is to be completed. Thus every contract must have five essentials, PARTIES, CONSIDERATION, SUBJECT MATTER, MUTUAL CONSENT, and TIME.

Parties. Those who make a contract must be considered competent

to do so, in the eyes of the law. The law says that the parties must be of legal age and sound mind. In most states the law regards all persons as infants who are under twenty-one years of age, though in a few states females are made of age at eighteen. A contract made with a drunken person, a minor, or an idiot is not binding upon him, except for food, clothing, or a place to dwell in. Other conditions of incompetency are insanity and coverture.

A contract made with a minor, while not binding upon him, is binding upon the other party, provided the minor chooses to enforce the agreement.

Everyone should be extremely careful in making contracts with people who are deemed incompetent by the law, for what might be ordinarily considered a necessity, may by reason of the circumstances of such person be declared by the court as not a "necessity."

The reason for considering infants incompetent to make a binding contract, is, that they are considered unable, on account of lack of experience, to guard against fraud and artful designing.

Infants are liable, just the same as adults, for fraud, assault, or any criminal act. While the law protects the infant from deceit and fraud, it will not, however, allow him to do unlawful acts.

A contract made under compulsion induced by threats of personal violence or injury, is illegal, but the fact of the threat being made must be proved.

A contract made by two or more persons with intent of injuring others, is illegal.

A contract in which there are misrepresentations or concealments of a material fact is illegal.

If a person signs a contract through fraud or misrepresentations, being led to believe that the contract means what it does not, or that the property purchased is different from what it really is, that contract is illegal. The burden of proof is in this case always on the person deceived. It requires good and abundant proof, because a written agreement goes farther in law than a single oath against it.

An agreement with a thief not to prosecute, provided goods are returned, is illegal.

Incompetency. "Persons of unsound mind and memory cannot make a binding contract, because they cannot give clear and intelligent consent to its terms. A noted writer has said: 'Want of reason must, of course, invalidate a contract, the very essence of which is consent.'

Insanity and idiocy are not the same. An insane person is one whose mind is diseased or deranged; an idiot is one who has no mind; and with the above the law classifies the man, who by drunkenness, renders himself incapable of discharging the ordinary duties of life.

By coverture, is meant marriage; the rule of the common law is that a married woman cannot, during her marriage, make a binding contract; but this has changed in nearly every State, giving to her either entire or modified control over her own property.

Consideration. This is the price or promise, or the cause which moves the parties to enter into a contract. It may be EXPRESSED or IMPLIED. A consideration that is distinctly stated in the contract, whether oral or written, is said to be expressed. In all sealed instruments and salable paper, the consideration is implied; as in promissory notes and drafts, the words, 'value received,' imply, but do not state the consideration.

Consideration is commonly called VALUABLE, GOOD, SUFFICIENT, LEGAL, INSUFFICIENT, etc.

The money value of a consideration does not determine whether it is SUFFICIENT, or not; a very slight consideration will support a contract if it is what the law recognizes as valuable.

A VALUABLE consideration may be illustrated by the 'payment of money, the delivery of property, the performance of work, making a promise for a promise, etc.'

A GOOD consideration is one founded upon affection, relationship, friendship, or gratitude. This will support a contract that has been performed, and then only between the parties themselves, but will not answer for an executory contract; that is, one to be performed in the future.

An insufficient consideration may be defined as one that is gratuitous, illegal, immoral, or impossible. There are exceptions to this gratuitous consideration; for instance, in case of labor performed for a party with his knowledge but not his expressed consent. Story and Townsend both give this illustration: 'If you work for me, I knowing what you are doing, and do not interfere or prevent you, it raises an implied promise, on my part, to pay what your service are reasonably worth, even though you may have commenced work without my order'."

Subject Matter. The subject matter of a contract is the thing to be done, or omitted by one or both parties. There are certain contracts

however, which the law will not enforce. That is, if the thing to be done is illegal, against the law, immoral, that is, contrary to good morals, (injurious to, or interfering with the public welfare), in general restraint of trade, such as an agreement not to conduct a certain lawful business anywhere, either for a limited or unlimited time, in general restraint of marriage, such as a condition that a child may not marry any person living in the same State or following some particular profession or trade, if the subject matter operates as a fraud on third persons, obstructs public justice, that is, suppresses evidence, bribes witnesses or officers, or if already compelled by law, because an agreement to do what is already required of one will not increase the obligation, or if it has in it in any way, the element of fraud, we cannot expect the law to enforce the contract.

Mutual Assent. This is defined to be a meeting of minds. There can be no binding contract without the assent of both parties; and they must assent at the same time and to the same thing. Mutual assent consists of an offer by one party and its acceptance by the other; when the offer is verbal, and the time allowed for acceptance is not mentioned it must be accepted immediately to make a contract. But in case the offer and acceptance are written and pass through the mails, the contract is complete when the acceptance is mailed; provided the person accepting has received no notice of the withdrawal of the offer before mailing his letter. When the offer calls for an answer by return mail, any acceptance later than by return mail will not be binding on the party making the offer.

Time. When the time in which a contract is to be performed is not expressed, the execution of the contract must be within a reasonable time; and this is to be determined by the thing to be done.

Construction of Contracts. In the construction of contracts no particular form of words is necessary, but the intention of the parties should be clearly and definitely stated.

Ignorance of Law. This is no reason for an omission or breach of contract; every one is supposed to know the law.

Simple Contracts are Expressed, Implied, Verbal, Written, Joint, and Several.

Verbal Contract. A contract made by mere words spoken by the parties is called a verbal contract.

Written Contract. A contract in which the agreement is in writing is called a written contract. It is no stronger than a verbal one

when the law allows it to be verbal, but the method of proof is different; the written contract generally proves itself.

Expressed Contract. An expressed contract is either verbal or in writing, in which the terms of the agreement are openly, fully and clearly stated.

Implied Contract. A contract in which the law presumes what must have been the agreement intended by the parties, is called an implied contract.

Joint Contract. A contract in which the parties are jointly (that is together), bound to perform the contract or agreement, is called a joint contract.

Several Contract. A contract in which two or more persons promise, each for himself, that he will do the whole thing promised, is called a several contract.

Contracts in Writing. While there are certain contracts that are not required to be in writing, yet it is safest and best to put them in black and white, because it may prevent frequent misunderstandings. Trouble more often comes from misunderstandings of verbal contracts than because the parties to the contract are dishonest. Often the party who wishes to deceive has a considerable bargaining before the agreement is concluded, and when the final agreement is made only a few words are exchanged, and these before an "accidental" witness. The previous remarks and guarantees given without witness are not in evidence in case of dispute. The facts sworn to by the "accidental" witness that no conversation like that which had been previously stated took place at the closing of bargain, and the case will be decided on the evidence of the "accidental" witness supported by the evidence of his "friend."

Contracts that Must be Written. Contracts for the conveyance of real estate; contracts for the lease of land for more than one year; contracts made upon consideration of marriage; contracts to answer for the debt, default, or wrongful act of another; contracts that are not to be performed within one year; and contracts for the sale of personal property of a specified value (usually fifty dollars); unless the sale is by auction, or the buyer pays part of the purchase-price, or the seller delivers part of the goods.

Guarantee. The seller of goods is not liable for the quality of the goods sold, unless he has represented or concealed something fraudulently, or has warranted them good and sound.

The rule is: "If there is no expressed warranty by the seller, nor

fraud on his part, and if the article is equally open for inspection of both parties, the buyer who examines the article for himself must abide by all losses arising from its not being what he wanted or expected."

When goods are found to be unsound, or are not such as were ordered, the purchaser should return them, as soon as the fact is discovered, to the seller, or give him notice to take them back; otherwise it will be presumed the quality is satisfactory.

Sale of Stolen Articles. When the buyer purchases goods, he receives his title in them from the seller; but if the goods prove to have been stolen, the true owner can reclaim them at any time. They might have been bought in good faith, in the regular order of business, and for a valuable consideration; but if the one from whom the buyer derives his title had none, it transpires that the buyer will have no title.

Sale of Personal Property. A sale is a contract by which the ownership is transferred from one person to another for a consideration in money paid or to be paid. To make it a sale there must be money paid or agreed to be paid in exchange for the goods. An exchange of goods for goods is "barter" or a "trade."

The party who purchases the property is called the purchaser, or vendee; the one who sells is called the seller or vendor.

The growing or expected products may be bought and sold, viz: the grain or grass expected to grow upon a field; the fruit that may grow in an orchard; or the future increase in cattle or other stock.

Delivery. It is not usually necessary that the goods be actually delivered. When the terms of the contract are agreed to and accepted the sale is complete. The title of the property then lays in the buyer, and he is entitled to it upon payment. The buyer can not take the goods till he pays for them. Here comes a nice distinction between the right of property, and the right of possession.

If the goods are sold to a person who "fails" or becomes insolvent before they are delivered, the seller may not deliver them. Even if shipped, they may be stopped in transit, by notice to the carrier not to deliver the goods.

Bill of Sale. As a protection against the goods purchased and named in a bill of sale, being seized for debts or judgments, it is best to record the same in the official records of the town or county as the law of the state requires.

KNOW ALL MEN BY THESE PRESENTS, that in consideration of Three

Hundred Twenty-seven Dollars (\$327.), the receipt of which is hereby acknowledged, I, John S. Peaslee, do hereby sell, transfer, grant, and deliver unto Ross Hamilton, to have and to hold, all my right, title and interest in the following goods and chattels, viz:

One bay horse, one set single harness, one Portland cutter, one light open buggy, one whip, and one blanket.

To have and to hold all of said goods and chattels forever. And the said John S. Peaslee hereby certifies that he is the lawful owner of said goods and chattels; that they are free from all incumbrances; that he has good right to sell the same, as aforesaid; and that he will warrant and defend the same against the lawful claims and demands of all persons whomsoever.

IN WITNESS WHEREOF, the said grantor has hereunto set his hand this 12th day of February, 1896.

WITNESSES :

JOHN S. PEASLEE.

Samuel Brousseau.

William I. Gardenier.

Contract for Letting Farm on Shares. Copy, making such such variations as the case requires.

This agreement, entered into this 12th day of February, 1896, by and between Abram L. Schermerhorn, of the town of Stuyvesant, Columbia County, State of New York, party of the first part, and James Johnson, of Coeymans, Albany County, State of New York, party of the second part.

It is hereby agreed that James Johnson, party of the second part, will on or before the first day of April of this year, take possession of the farm of Abram L. Schermerhorn and commence the duties of caring for and cultivating said farm, and will continue the same for the term of one year from said date, April 1st, 1896.

It is agreed that the said party of the second part shall cultivate said land in a scientific, workmanlike manner, putting in the crops at the usual accepted time for so doing, so as to get the best of results obtainable.

It is agreed that each shall furnish one-half of the seed used upon the farm during the year; that said party of the second part shall furnish all the labor, tools, and horses necessary to properly and timely prepare the ground for the crops, properly place them in the ground, timely cut, harvest, protect by placing in the buildings on said farm when harvested,

properly thresh, clean or otherwise prepare all crops, as the case demands, for market; to deliver the same to the nearest market at the usual time for marketing, unless otherwise hereafter agreed.

Each party to have one-half of the receipts from the sale of the produce raised during the year.

Each party is to furnish one-half of the cows, sheep, swine, and poultry, but the party of the second part is to perform all the labor necessary to properly care for the same, as well as the milking and making of the butter. Each party to have one-half of the proceeds arising from the sale of these animals or their productions.

It is further agreed that the party of the second part shall leave the same amount of wheat or rye sown upon the premises at the expiration of this lease, as are upon the farm the 1st day of April, 1896, namely: forty acres.

The party of the second part agrees to keep all the gates, fences, and buildings in good repair, said party of the first part furnishing the necessary material for so doing; and further agrees to prevent, as far as possible, any injury by person, horses, cattle, or animals of any kind, to the hedges, trees, or fences.

IN WITNESS WHEREOF, we have hereunto signed our names this 12th day of February, 1896.

ABRAM L. SCHERMERHORN. [Seal.]

JAMES JOHNSON. [Seal.]

Contract for Hiring Help. The following form will prevent all misunderstandings as to wages, or duties. Make two copies exactly alike and let each take one:

KNOW ALL MEN BY THESE PRESENTS:—That Edward L. Brockway hereby agrees to enter the services of John Gray Kittle, for the term of eight months, beginning April 1st, 1896, as a general farm laborer, and hereby agrees to do any work he may be called upon to do in connection therewith, in the town of Schodack, Rensselaer County, State of New York.

In consideration of the above mentioned services, being faithfully and well performed, the said John Gray Kittle agrees to pay the said Edward L. Brockway twenty dollars a month and board.

It is further agreed that should Edward L. Brockway leave the services of the said John Gray Kittle before the annual summer harvest is completed, without consent of said John Gray Kittle, or having just rea-

sons for so doing, then said Edward L. Brockway is to receive fifteen dollars a month and board for the time while in the service of John Gray Kittle, in place of the twenty dollars and board, as agreed.

IN WITNESS WHEREOF, the said parties have hereto set their hands this 12th day of February, 1896.

EDWARD L. BROCKWAY.
JOHN G. KITTLE.

Contract for Sale of Farm or House and Lot. Agreement entered into this 12th day of February, 1896, between John S. Baker, of the town of Stuyvesant, Columbia County, State of New York, party of the first part, and John R. Steele, of the town of Schodack, Rensselaer County, State of New York, party of the second part, witnesseth:

That John S. Baker, party of the first part, for a consideration hereinafter mentioned, shall sell and convey to John R. Steele, party of the second part, all that part and parcel of land situated partly in the town of Stuyvesant, Columbia County, State of New York, and partly in the town of Schodack, Rensselaer County, State aforesaid, and described as follows:

(Here describe the land to be conveyed according to last deed, or other boundaries).

It is agreed that said party of the first part shall execute and deliver to the said party of the second part a warranty deed, containing the usual warrantee that the place is free and clear of all encumbrances other than noted in said deed.

That said party of the second part, upon delivery of said deed duly and legally executed, shall pay to said party of the first part the sum of Twenty-five Thousand dollars, (\$25,000).

It is further agreed that if any default is made in this agreement, or any part thereof, the party making such default shall pay to the other party to this contract the sum of five hundred dollars (\$500.) It being agreed that said amount shall constitute the damage to the party not defaulting, in place of any or all other damages that may appear.

IN WITNESS WHEREOF, we have hereunto set our hands and affixed our seals this 12th day of February, 1896.

JOHN S. BAKER. [L. s.]
JOHN R. STEELE. [L. s.]

WITNESS :
William D. Griffin.

Receipts. It is always best to take a receipt for moneys paid or goods delivered, and while a receipt is not always evidence of payment, yet it throws the burden of proof upon the one who tries to deny its truth.

Receipt for Money Paid on Account.

\$50.00.

ALBANY, N. Y., Feb. 12, 1896.

Received of George W. Witbeck, Fifty Dollars (\$50), on account.
GARDNER MOREY.

Receipt in Full.

\$300.00.

ALBANY, N. Y., Feb. 12, 1896.

Received of Charles Hart, Three Hundred Dollars, in full for all demands to date.

HENRY MURPHY.

Law Concerning Notes.

1. A signature written with a lead pencil is valid.
2. A note lost or destroyed can be collected upon sufficient proof.
3. If no time of payment is mentioned in a note, the note is payable on demand.

A note is not transferrable if the words "or order" or "or bearer" do not appear on the face.

HOW TO DO BANKING BUSINESS.

Deposit Your Money. It is unsafe to keep money about the person or house, on account of the liability of losing it from the pocket. The house might take fire and destroy the money before it could be removed; or the money may be stolen by thieves or robbers. It is therefore best to deposit it in some safe bank that is near by. The money can then be drawn out by checks made payable to the order of the person to whom the money is to be paid, and as that person has to put his name on the back of the check, it is good evidence that the money has been received.

Pay Bills by Checks. It is a good practice to pay all bills by checks because :

1. The amount paid is always specified in the check.
2. The party receiving the check can not claim that the money has not been paid.
3. The check coming back through the bank, endorsed, is evidence

that the money has been received by the person to whose order the check was drawn.

It is always best to deposit put your money in the bank and check against it. This will show the amount of money handled during the year, and often times be a check upon expenditures.

Never make a check payable to bearer, for in that case it is not necessary for the party receiving it to put his name on the back, and if lost, it can be collected by any one into whose hands it falls.

A check is a very handy way of sending money in letters. If made payable to the order of the person to whom the money is sent, it can not be collected by any one else, even though stolen from the letter.

If dealing with a firm, with which you have no acquaintance, it is often well to have the cashier of the bank certify the check, before it is sent. This is done by the cashier writing across the face the word "certified" and signing his name as "cashier" of the bank.

How to Endorse Checks. Endorsing checks is done by writing your name on the back. This is properly done by signing the name across the top about one and one-half inches from the end. This is the left end as the check lays with its face toward you.

Promissory Note. Occasionally it is necessary or convenient to ask for time for the payment of a bill, and there is given a Promissory Note, (promise to pay at some specified time). It is generally written in the following form:

\$100.

ALBANY, N. Y., Feb. 12, 1896.

Three months after date I promise to pay to Peter J. Murphy, or order One Hundred Dollars, at the Albany Commercial Bank, for value received.

THOMAS A. BURNS.

NATURALIZATION PAPERS.

Declaration of Intention. An alien must make a declaration under oath, of intention of becoming a citizen of the United States, before a circuit or district court of the United States, or a court of record of any of the States.

This Declaration of Intention may be taken at any time, even as soon as landed, but the time of residence in the country before becoming a citizen must be five years. Before taking the oath of allegiance which

will make him a citizen, the Declaration must have been made two years before.

Oath of Allegiance. This can be taken after five years residence in the United States, provided the Declaration of Intention has been taken at least two years before.

Exceptions. The following exceptions lessen the time of residence to become a citizen, and also changes the manner of becoming a citizen.

1. A alien who has served in the United States army and been honorably discharged, may become a citizen without declaration of intention, provided he has resided in the United States one year.

2. An alien who came to the United States under eighteen years of age can become a citizen after being here five years by only taking one oath, and that is the oath of allegiance.

3. Aliens who become citizens make all their children citizens, who are under the age of twenty-one at the time of their becoming citizens, provided they are dwelling in the United States at the time of their parents' naturalization. All over twenty-one and those living in a foreign country, must take the general course of naturalization.

NOTE—It is not generally known that women are obliged to take the same steps to become citizens as men. They are, however, made citizens upon the naturalization of their husbands, or upon marrying a citizen.

PRINCIPAL AND AGENT.

Definition. "An agent is one who acts for, in the name, and by the authority of another, who is called the principal.

Theory. The theory of the law is that whatever business a man may do for himself, he may employ another to do for him; and whatever is done for him by his authority, is to be held the same as though he did it himself.

Extent. When we consider the fact, that every clerk, laborer, or employee, is the agent of the one who employs him, we see how impossible it would be to conduct business without the medium of agency. There are in the employ of the New York Central and Hudson River Railroads some fifteen thousand persons; each one of whom is an agent of the company.

How long could Vanderbilt run his great railroad if himself compelled

to drive the engine or handle the brake? Thus we see how each business and every enterprise needs its controlling, its guiding mind, which works through others.

How Established. An agency may be established by a person permitting another to hold himself out to the world as his agent, by a verbal agreement or by written contract; as little form is necessary to employ an agent, as to hire a common day laborer. But when the agent is to have authority to execute a sealed instrument, as for the conveyance of real estate, his authority must be given under seal. An agency is also often implied from the course of business; as for instance, a son who sells goods in his father's store, or receives payment of bills due him with his knowledge and without objection, is the agent of the father, and may bind him in subsequent transactions of the same nature.

Principal. The PRINCIPAL is the person for whom the business is to be transacted. Generally every person of legal age and competent to contract, may act as principal. The principal and not the AGENT is bound by the agent's acts, so long as the agent does not EXCEED the authority given him.

Liability of Principal to Third Parties. When an agent acts within the limits of his authority, the principal is liable to third persons, the same as though he transacted the business himself. If the agent violates the instructions given by the principal, the person with whom he is dealing being ignorant of the fact, or if the agent makes a fraudulent representation, the principal will be held liable. The principle of the law is that "when one or two innocent persons must suffer, the one should sustain the loss who has put it in the power of the wrong-doer to commit the wrong," but in cases of special agency the agent could not bind his principal to exceed his special authority.

If an agent is pursuing the business of his agency, and by his negligence or unskillfulness injures another, the principal and not the agent is liable; for instance, suppose you are riding on an express train from Albany to New York, you are rushing along with speed that rivals the wind; a careless engineer has his engine standing upon the track of your train, when it ought to have been somewhere else; you go crashing into it, there is a wreck, and you are pulled from the debris only to find yourself a cripple for life. What do you do? Bring action for damages against the engineer, who is the agent of the railroad company, or do you say to the company itself, I have been injured through the carelessness of your agent, and to you I look for damages.

Should the act of the agent be willful, the agent, and not the principal, is liable; to illustrate, I am passing along the street in my carriage and your servant willfully drives against me, the servant alone is liable. But had the act been one of carelessness you, the principal, would be liable.

The Principal is Liable to the Agent for damages sustained by the agent, without his own default, in following the directions of his principal.

Duties of Agent to Principal. The first duty of every agent is to obey instructions. In cases of extreme necessity the agent may be excused for disobedience of orders; neither is he bound to obey when told to do an illegal or immoral act.

An agent must transact all business in the name of his principal, or he will be personally liable.

An agent must not mix his property with that of the principal, so as to make it impossible to distinguish one from the other.

Commission Merchants. A commission merchant is one who sells goods for another, receiving as compensation, a certain percentage on the sales, called commission. The commission merchant very seldom discloses the name of his principal. He has actual possession of the goods to be sold; and is bound to take good and proper care of them, such as he would take of his own property of a similar nature.

In the sale of goods the commission merchant should observe the instructions of the person sending the goods to be sold; but when he receives no instructions, must use his utmost skill and knowledge, and sell for the best prices.

It is a common practice for commission merchants to advance money upon goods consigned to them. In such cases they have a lien upon them for all cash advanced, and for expenses and commissions. "A lien on personal property is a right to hold it against the owner;" that is, the owner can not take away his goods until he has paid the charges against them. The commission merchant may sell the goods in his possession in order to satisfy his claim, but must pay over the surplus to the owner."

NOTE.—1. A seller of goods who accepts, at the time of sale, the note of a third party, not endorsed by the buyer, in payment, can not in case the note is not paid, hold the buyer responsible for the value of the goods.

2. An agreement by the holder of a note to give the principal debtor time for payment, does not discharge the surety.

SPECIAL LAWS.

BY

Hon. F. R. GILBERT.

LAWS RELATING TO RIGHTS AND OBLIGATIONS ARISING FROM OWNERSHIP, CONTROL AND CUSTODY OF DOMESTIC AND OTHER ANIMALS, AND OTHER LAWS OF SPECIAL INTEREST TO LAND AND ANIMAL OWNERS.

A MAN may have an absolute property in domestic animals, which is not lost by accident or the interference of others.

As to wild animals, they belong to anyone, so long as they remain in their wild state, but when captured and brought under the control of the capturer, so that they cannot escape, they become the property of the one who captured them.

The most obvious distinction which the law regards is that between such animals as are generally seen tame and seldom, if ever, found wandering at large, and such as are usually found wild, and at liberty, Deer in a private park; doves in a dove house; and fish in a private pond or tank, are property while they continue in actual possession. If a deer or any other wild animal which is reclaimed has a collar or other mark put upon it, and goes and returns at its pleasure, the owner's property still continues. (*Amory v. Flynn*, 10 Johns. 102.)

The true point of inquiry in such cases is whether the reclaimed animal has lost all intention or disposition to return, and if it has, it may then be said to have regained its natural liberty.

A qualified property may also exist with relation to wild animals by reason of their inability to remove from the land where they are, as in the case of young birds which are hatched in nests in a man's trees.

“A qualified property in wild animals may be obtained by a person so confining them that they cannot escape and regain their natural liberty.” (2 Blackstone’s Commentaries, 391.)

Property in this class of animals is acquired only by possession. Mere pursuit is not sufficient to constitute such possession, though the animal be kept in sight, the pursuer must, by wounding or securing the animal, or otherwise, have deprived it of its natural liberty, and brought it within his control.

Thus, where N. wounded a deer and followed the track until night and resumed the pursuit in the morning, but the deer, after running, six miles with N.’s dog in chase, was killed by B. *Held*, that it had not been deprived of its natural liberty so as to give N. any property in it.

So, wild fowl which have been tamed, are subjects of property, notwithstanding they are temporarily astray, if they have not regained their natural liberty as wild.

So, bees are regarded as animals *feræ naturæ*, but when hived and reclaimed, a qualified property may be acquired in them. But merely marking the tree in which bees are found does not reclaim the bees, nor vest any property in the finder. Wild bees on a tree belong to the owner of the soil, who may license another to take them, and bees escaping from a hive and swarming on the land of another do not belong to the owner of the soil on which they have swarmed, but to him who had the former possession; but he cannot enter upon the land of another to take them, without subjecting himself to an action of trespass unless he has the owner’s permission to do so.

In the case of domestic animals and reclaimed wild animals the owner has the right to use any of the remedies which the law provides for the recovery of personal property illegally taken or detained from the owner. So, the owner of such an animal has a right of action for damages if one should, either intentionally or negligently, injure, maim or kill such an animal.

Not only the owner, but one who is in possession of an animal under an arrangement that renders him accountable for it, or for injury to it, may sue to recover for any loss or injury done the property while it is in his possession. In such a case the person in possession is treated as the owner, and is entitled to all the rights of an owner.

So the owner may recover for accidental or intentional injuries, as where a dog, followed by his master, was pursuing a fox, and was acci-

dentally shot by another party who claimed to have shot at the fox, but accidentally killed the dog, the owner was entitled to damages. (Wright v. Clark, 50 Vermont, 130.)

Where a hog trespassed on the premises of a neighbor of the owner and injured his crops, and was pursued by the neighbor and his dog and killed, the owner of the hog was held to be entitled to damages for such killing. (Thompson v. State, 67 Ala. 106.)

Where animals when trespassing are killed in a wanton, malicious and deliberate way, exemplary damages may be recovered.

Injuries inflicted upon animals by negligence entitles the owner to an action for damages against the one who inflicts the injury, as, where the owner of a quantity of hay spills some white lead paint upon it, and tried to separate the damaged part, and thought he had succeeded, when he sold the undamaged part without giving notice of the fact to the purchaser whose cows died in consequence of eating thereof. (French v. Vining, 102 Mass. 132.)

Nor has a party the right to entice by food, voice or other means, any domestic or reclaimed animal away from the possession of the owner and bring it under his control. For such conduct the owner has an action for the value of the animal so obtained, and the party committing the wrong may be prosecuted criminally for larceny.

In many of the States the registered cattle brand is *prima facie* proof of ownership, and, therefore, any wrongful marking or branding of cattle with intent to defraud is a conversion of the cattle, and indictable. But the intent to defraud must be shown, and it is not sufficient that the owner does not consent.

The offense of altering a brand on cattle may be committed by merely clipping the hair of the original brand. Putting a brand on an animal additional to the one already on it is an alteration of the brand first put on, although the latter brand may not interfere with or change the form of the first one, and the owner will be entitled to an action. An unlawful branding of a colt, the owner of which is unknown, is indictable.

For cases of changing brands or false marking, see DeGarca v. Galvin, 55 Texas, 53; Allen v. State, 42 Texas, 517; Fossett v. State, 11 Texas, App. 40; and Morgan v. State, 13 Fla. 671.

Hiring a horse to travel a certain distance, and driving the horse a greater distance, or to another place than the one agreed upon is such a conversion of the horse that an action will lie by the owner.

Where a horse is driven a greater distance than that for which it was hired, the owner may ratify the wrongful act by accepting compensation for the extra distance traveled.

In relation to injuries of persons or property by domestic animals, the following propositions are sustained by the courts of most of the States:

The owners of domestic animals are generally not liable for the injuries they may do to property or persons of others, so long as they are rightfully in the place where it is alleged that the injury or mischief was done, unless it be shown that the particular animal doing the injury was vicious and was accustomed to do, or had an inclination to do the mischief complained of, and that these facts were known to the owner of the animal before the injury occurred. It is not absolutely necessary to prove actual or positive knowledge on the part of the owner in order to establish liability, but if the owner has seen or heard facts relating to the viciousness of the animal which would ordinarily satisfy a man of prudence and caution, that the animal was liable to do mischief of the character complained of, it would place him under obligation to secure the animal in such a manner as to prevent the injury, and he would be liable if he did not so secure it.

The rule is different with reference to vicious, wild animals which have been tamed, such as lions, tigers, and the like, for he who keeps them is liable without notice on the ground that such animals are fierce and dangerous by nature.

The owner or keeper of animals viciously disposed or of mischievous habits, of which the owner had previous actual or implied notice, is bound at his peril to keep them at all times, and in all cases, properly secured, and is responsible to anyone who, without fault on his part, is injured by them. (105 Mass. 71; 106 Mass. 381; 65 N. Y. 54.)

At common law the rule is that every man is bound to keep his animals within his inclosure at his peril, and that he is liable in damages if he fails to do so, and they escape to the property of others and do injury, whether such property be fenced or not; unless the trespass is committed upon property through defects in fences, which the owner of such property is bound to maintain.

Every unauthorized entry by animals upon the land of another is a trespass, whether the land be enclosed or not.

If domestic animals are wrongfully in the place where they do mischief, the owner is liable, though he had no notice that they were accus-

tomed to do so before. As where oxen break the plaintiff's close and kill his cow, the owner of the oxen will be liable to damages, without proof that he knew they were accustomed to gore.

Adjoining owners and occupants of lands are each required to maintain their portion of the division fence, and where injuries are occasioned by domestic animals escaping through defects in that portion of the fence that the complaining party was under obligation to maintain, he cannot recover for such injury. Indeed, he may be liable for injuries which may have resulted to the animals thus escaping, if shown to be the proximate result of his negligence.

Where there is no division fence, each owner or occupant must keep his animals upon his own side of the line. Where there is a division fence and it is divided, each adjoining owner must see to it that his part of the fence is suitably maintained. Where there is no division of the line fence, and either party refuses to make a division, then the law in the various States provides a summary method for a compulsory division of the fence, and when thus divided, the parties may be compelled to build and maintain it.

THE KEEPING OF DOGS.

Perhaps there is no species of domestic animals in relation to which controversies more frequently arise than in relation to dogs. The following propositions may be regarded as settled by the courts:

An owner of lands may drive off trespassing animals with dogs, and will not be liable unless they are vicious and unnecessarily bite and lacerate the animals. (*Smith v. Waldorf*, 13 Hun, 127.)

One keeping a vicious dog with knowledge of its propensities, is responsible for injuries done by it. Negligence, in the ordinary sense, is not an element of the cause of action. Nor is contributory negligence a defense. To constitute a defense it must be established that the injured person brought the injury on himself. (*Lynch v. McNally*, 73 N. Y. 347.)

A person who keeps upon his premises ferocious dogs, and is aware of their dangerous and vicious propensities, is liable for injuries to a stranger, not an intentional trespasser, even though they had never before bitten anyone. (*Rider v. White*, 65 N. Y. 54.)

A servant may maintain an action against the master for injuries received from his employer's dogs, though informed of the dog's vicious disposition, where it had been the custom to tell the servant when the

dog was loose, for the servant assumes, on entering such employment, only the risk consequent upon keeping such a dog which is fastened, except when the servant is otherwise notified. He does not take the risk of being bitten when the dog is negligently left unfastened. (*Muller v. McKesson*, 73 N. Y. 195.)

The doctrine of the non-liability of the master to the servant for injuries of a co-servant, cannot be invoked, to shield the owner of a ferocious animal for liabilities for injuries to the servant occasioned by negligence of a fellow-servant in not properly fastening the animal, or of not giving notice of the animal being loose. (*Id.*)

The owner of a ferocious animal is not relieved from liability for injuries inflicted by it through slight negligence or want of ordinary care on the part of the person injured. To constitute such a defense acts must be proved, with notice of the character of the animal, establishing that the person injured voluntarily brought the injury on himself. (*Id.*)

Ordinary familiarities with a dog running alone by one without knowledge of its disposition is not negligence which will relieve the owner from responsibility. (*Lynch v. McNally*, 73 N. Y. 347.)

The owner of a dog known by him to be ferocious is liable, unless the person injured voluntarily incurred the danger with a full knowledge of its probable consequences. (*Fanning v. Hagadorn*, 9 Weekly Digest, 36.)

The owner of a vicious dog which is kept properly chained and under restraint is not liable for injuries sustained by a person voluntarily coming within its reach for the purpose of becoming familiar with it by feeding. (*Werner v. Winterbottam*, 17 St. Reporter, 751.)

The fact that a dog was kept chained upon defendants' premises for their protection, charges the owner with knowledge of its character, so that he is liable without proof that the animal had actually bitten any person, before it committed the injury complained of. (*Brice v. Bauer*, 108 N. Y. 428.)

The risk of harboring a dog which has habits calculated to frighten horses lies upon the person who controls him, and he is liable for mischief caused thereby. (*Putnam v. Wigg*, 37 St. Reporter, 304.)

Where plaintiff went upon defendant's premises to cut grass, given to him by defendant's manager for the cutting, and was bitten by defendant's dog, held that he was entitled to recover for the injury. (*Hubert v. Bedell*, 50 St. Reporter, 251.)

Where a person keeps a dog for the purpose of guarding his property, which is usually kept chained and muzzled, an inference of knowledge of the propensity of the dog to bite and attack mankind, and of negligence in allowing him to be at large, is proper. (*Hahnke v. Frederick*, 140 N. Y. 224.)

At common law, the dog is considered a tame, harmless and docile animal, and its owner not responsible for any vicious or mischievous act he may do, unless he had a previous knowledge of mischievous or vicious propensities of the dog.

By statute in New York, taxes are imposed on dogs in every county, except New York, as follows:

"Upon every bitch owned or harbored by any one or more persons, three dollars; for every additional bitch harbored by the same persons or family, five dollars; upon every dog, other than a bitch, owned or harbored by one or more persons, or any family, fifty cents; and upon every additional dog owned or harbored by the same person or persons, or family, two dollars."

The owners are required to deliver a description of the dogs to the assessor, and for refusal are subject to a forfeit of five dollars.

The collector of each town is required to pay over the taxes collected on dogs to the supervisor of the town, and the moneys so collected and paid over shall constitute a town fund for paying damages arising in said town by dogs killing sheep.

If any person whose dog is duly assessed shall refuse or neglect to pay the tax assessed for five days after demand thereof, it is lawful for any person to kill the dog so taxed.

Under the same statute it is provided, if any dog shall kill or wound any sheep or lamb, the owner or possessor is liable for the value of such sheep or lamb to the owner thereof, without proving notice to the owner or possessor of such dog or knowledge by him, that his dog was mischievous or disposed to kill sheep.

When such injury occurs, the owner of the sheep may apply to any two fence viewers of the town, or assessors of the city, or of the ward of the city, who may examine the facts relating to such injury, and if satisfied that the injury was caused by dogs, they shall certify the extent of the injury and the amount of damages sustained, and the amount specified in such certificate shall be paid out of the fund above mentioned.

With reference to the acts of other vicious animals, the following propositions may be regarded as settled by the courts:

One letting a vicious horse to hire is bound to inform the hirer of its vices.

In the absence of proof that the animal alleged to be vicious had done mischief similar to that complained of, or was by habit or nature of an ungovernable temper, or that the defendants had knowledge or notice that the animal was unruly, or had done similar acts, the owner is not liable, unless the vicious act occurred while the animal was trespassing. (*Moynahan v. Wheeler*, 117 N. Y. 285.)

In an action for personal injuries to plaintiff, caused by his being attacked by defendant's bull which was trespassing on plaintiff's land, the trial judge declined to charge that, if the animal was trespassing on the land of the plaintiff, and while there trespassing did damage to him, then, whether he was a vicious animal, or known to be so to the defendant or not, the plaintiff is entitled to recover for the injury. *Held*, that such refusal was error. (*Malone v. Knowlton*, 39 St. Reporter, 901.)

A vicious domestic animal, if permitted to run at large, is a nuisance, and a person who knowingly keeps or harbors it, and thus affords it a place of refuge and protection, is liable for the maintenance of a nuisance, and for the damages directly resulting from it. (*Quilty v. Battie*, 135 N. Y. 201.)

This liability extends to the case of a married woman who permits her husband to harbor a vicious dog upon the premises owned by her, and occupied by her family, she having knowledge of its vicious propensities. (*Id.*)

So, the owner of a vicious horse held liable to a servant employed to drive it, without notice of its vice, who is injured by a kick from the horse. (*Helmke v. Stetler*, 69 Hun, 107.)

INCREASE OF DOMESTIC ANIMALS.

Of all tame and domestic animals, the brood belongs to the owner of the dam or mother. (*Stewart v. Wallace*, 33 Missouri, 154; *Hanzen v. Millet*, 55 Me. 184; *Hazelbacker v. Goodfell*, 64 Ill. 238.)

But where a dam or mother is hired out for a limited time, the increase belongs to the hirer, who, by hiring, becomes the temporary owner of the animal. (*Putnam v. Wyley*, 8 Johns. 432; *Concklin v. Havens*, 12 Johns. 314.)

But a father who loans cows to a married daughter and retains the title in himself, so as to prevent the cows from being sold by an intemperate husband, or his creditors, owns the increase. (*Orser v. Storms*, 9 Cowen, 687.)

So, a mortgagee, under a mortgage upon live stock, is entitled to the increase of the stock, and a purchaser of the increase takes it subject to the mortgage. (*Grundy v. Biteler*, 6 Ill. App. 510; *Kellogg v. Lovely*, 46 Mich. 131; *Thorpe v. Coles*, 55 Iowa, 408.)

A colt foaled while its dam is held under a bailment or executory contract of purchase, by the terms of which the title is to remain in the bailor or vendor until the agreed price is paid, is also subject to the terms of the contract. (*Elmore v. Fitzpatrick*, 56 Alabama, 400.)

CRUELTY TO ANIMALS.

In various States statutes have been enacted for the prevention of cruelty to animals. These statutes are so far similar that a general statement of their provisions is sufficient.

If any persons shall overdrive, overload, torture, torment, deprive of necessary sustenance, or unnecessarily or cruelly beat, or needlessly mutilate or kill, or cause or procure to be overdrawn, overloaded, tortured, tormented, or deprived of necessary sustenance, or by unmercifully or cruelly beating, or needlessly mutilated or killed, as aforesaid, any domestic animal, every such offender shall, for every such offense, be deemed guilty of a misdemeanor. (*State v. Gould*, 26 W. Va. 258.)

Abandonment of a disabled animal; carrying animals in a cruel manner; transporting animals for more than twenty-four consecutive hours without unloading for rest; failing to water and feed them during ten consecutive hours; poisoning or attempting to poison animals; throwing substances injurious to animals, as glass and nails, willfully and maliciously, in a public place, setting on foot fights between birds and animals, and keeping a place where animals are fought, are generally made misdemeanors. Also slaughtering with unnecessary cruelty.

By the Penal Code of the State of New York, it is made a misdemeanor to overdrive any animal; failing to provide proper sustenance; abandonment of a disabled animal; failure to provide food and drink to impounded animals; selling or offering to sell or exposing for sale disabled animals; carrying animals in a cruel manner; wantonly poisoning an animal; throwing substances injurious to animals in public

places; keeping milk cows in unhealthy places, and feeding them with food producing unwholesome milk; running horses on highways, etc.

A person has no right to kill trespassing animals. He must resort to his legal remedy of impounding them, or bringing an action for damages, and it is unlawful to entice a neighbor's animals into danger by setting traps baited with strong scented meat, or resorting to any other contrivance by which they might be injured or destroyed.

DISEASED CATTLE.

It is not unlawful for the owner of cattle affected with a contagious disease to keep them on his own premises, and he will not be liable if the disease is communicated to other cattle on adjoining lots, if he, while knowing of the diseased condition of the cattle, is not negligent in the manner of keeping them. And it has been held, even if he keeps them on a portion of his property not enclosed where other cattle also have a right to come, he will not be guilty of negligence if he gives the owners of such other cattle notice of the diseased condition of his cattle. (*Walker v. Herron*, 22 Texas, 55.)

This rule does not hold good in Illinois. (*Mount v. Hunter*, 58 Ill. 246; *Herrick v. Gray*, 83 Ill. 85.)

In case of trespass by diseased cattle, in consequence of which the disease is communicated to others, the owner will be liable if he is unaware of the diseased state of his cattle. (*Barnum v. VanDusen*, 16 Conn. 200.)

Where defendant allowed diseased sheep to escape through a defect in his part of the fence, and to communicate the disease to plaintiff's sheep, he will be liable, and the fact that the disease had been previously communicated to his sheep by one of plaintiff's sheep, will not avail him. (*Herrick v. Gray*, 83 Ill. 85, *supra*.)

The owner of animals affected with a contagious disease has no right to bring them in contact with other animals, as to water them at a public tank used by sound animals of other owners, or to bring a glandered horse upon a farm of another who has a sound horse there. If by any such means the disease should be communicated, he will be liable in damages. (*Mills v. N. Y. etc. R. Co.*, 2 Rob. 326; *Hite v. Blandford*, 45 Ill. 9.)

The sale of diseased animals, where the vendor knows of the presence of the disease, and fails to communicate his knowledge to the purchaser, the vendor is liable for all damages resulting from the

spread of the disease among the purchaser's cattle. It must be shown, however, that the damage was the direct result from the diseased cattle and not from some remote cause.

The owners of strayed horses and cattle are liable in damages for injuries done by them, if they are at large by reason of the owner's negligence.

The owner of animals is bound to bring to the notice of those dealing with his animals, as bailees for hire, farriers, agisters, keepers of boarding stables, etc., any vicious trick or habit the animals may have, as biting and kicking of horses; horning of cattle; biting of dogs; else he will be liable for any injury inflicted upon such persons in consequence of such vicious habits.

But this does not extend to injuries inflicted in consequence of habits which are not dangerous *per se*, as when a horse is in the habit of pulling back on the halter when restless.

In letting a horse the owner impliedly undertakes that the animal shall be capable of performing the journey for which he is let, and if without fault of the hirer, the horse becomes disabled by lameness or sickness, any expense the hirer may incur thereby is a valid claim against the owner.

One who loans horses is not responsible to a third party for damages done by reckless driving, or through negligence of a hirer or borrower, otherwise than when he entrusts his wagon and horse to an obviously incompetent person.

One who hires a horse is bound to only ordinary care in using it, and if he uses such care he will not be liable if the horse, during such reasonable use, is lamed or injured. But if he hires a horse for a definite period, and uses it after the time has expired, he will be liable for any injury it may receive during such extra use, and the same principle will apply if he drives it beyond the distance agreed upon. The horse must be used for the purpose it was hired, and for no other.

Where one hires a horse and receives special instructions from the owner about its use, he must comply with the instructions, or he will be liable for loss occasioned by disregarding them.

A bailee of animals for hire is bound to exercise that degree of care and prudence that a prudent man would exercise over his own property.

Animals may be destroyed where it is found necessary to protect a person and in some instances where it is necessary for the preservation of property. (Aldrich v. Wright, 53 New Ham. 398.)

Where several animals belonging to several owners unite in doing mischief, the owners cannot be legally joined in a single action for the mischief, because each owner is liable for the acts of his own animal, and not for injuries caused by the animals of others. (Van Steenburgh v. Tobias, 17 Wendell, 562.)

Chief Justice Swift, in the case of *Russell v. Thompson*, 2 Conn. 206, states the rule to be: "Where two dogs belonging to different owners made a raid upon a flock of sheep, the owners are responsible for the mischief done by their dogs, but no man is liable for the mischief done by the dog of another, unless he had some agency in causing the dog to do it. When the dogs of several persons do mischief, each person is only liable for the mischief done by his own dog, and it would be repugnant to the plainest principles of justice to say that dogs of different owners, by joining in doing mischief, could make the owners jointly liable. This would be giving them a power of agency which no animal was ever supposed to possess."

Under the statutes of some of the States, the several owners of dogs which unite in doing injury are jointly liable for the injury done.

In Pennsylvania each owner is answerable for the whole damage done in which his dog is jointly engaged. (*Kerr v. O'Connor*, 63 Pa. St. 341.)

In New York the owner is responsible for the injury done by his own dog. (See *Auchmuty v. Ham*, 1 Denio, 485.) So, where cows belonging to several owners are found in a garden of an individual, committing a trespass, each owner is liable for the damage done by his own cow, and for no more. (*Partenheimer v. Van Orden*, 20 Barb. 479.)

And in the absence of all proof as to the amount of damage done by each cow, the law will infer that the cattle did equal damage. (*Id.*)

WARRANTY OF THE SOUNDNESS OF ANIMALS.

What constitutes soundness.

Local custom and usage, as well as circumstances of each case, determine the meaning of the word sound, when it is applied to the sale and warranty of horses, sheep and cattle.

The general rule implies the absence of any disease in the animal at the time which actually decreases its value or its natural usefulness. There is a great difference, however, among judges as to what constitutes a breach of warranty of soundness, whether the disease must be temporary or permanent in its nature.

Some of our States follow the English rule, which seems logical and reasonable, and that is: Any infirmity which renders an animal unfit in any degree for present use, is unsoundness. In the case of *Elton v. Brogden*, 4 Camp. 281, it was proved that the horse was lame at the time of the sale, but the defendant undertook to prove that the lameness was of a temporary nature, and that the animal had become sound. The presiding justice said: "I have always held, and hold now, that a warranty of soundness is broken if the animal at the time of sale had any infirmity upon him which rendered him less fit for present service. It is not necessary that the disorder should be permanent or incurable. While a horse has a cough he is unsound, whether that proves temporary or mortal. The horse in question having been lame at the time of sale, when he was warranted sound, his condition subsequently is no defense to the action."

This doctrine has long been followed in Massachusetts and some of the other States. In *Brown v. Bigelow*, 10 Allen, 242, it was held that the bill of sale of one horse, sound and kind, is a guaranty of soundness, upon which the person who sold the horse is liable if the horse prove to be permanently lame, although the purchaser knew he was lame before he purchased the animal, and the seller then refuses to give a warranty. The chief justice said: "The doctrine that the warranty of soundness does not include or cover obvious defects, rests on the reasonable presumption that the parties could not have intended the warranty to apply to the defect rendering the horse unsound, which was seen and known to both parties at the time of the sale, but here the appearance of the horse did not disclose actual unsoundness, the unsoundness was not apparent. Lameness may or may not make a horse unsound. If it was only accidental and temporary, it would not be a breach of warranty, or if it was permanent, arising from causes which were beyond the reach of immediate remedies, it would be clearly a case of unsoundness. The reasonable inference is that the warranty was intended to guard against the liability of loss, in the event that the lameness proved permanent and serious." In *N. H.*, Judge Woods, in *Roberts v. Jenkins*, 21 N. H. 116, said: "If the horse be afflicted with an infirmity which renders him less fit for immediate use than he otherwise would be, less able to perform the proper and ordinary labor of the horse, it would seem but reasonable that it should be regarded as an unsoundness, if the party selling the horse warranted its soundness, he should be held responsible. Such an infirmity may well be

supposed to be the occasion of damages to the purchaser. The intention and understanding of the parties to the warranty was, in such as well as in other contracts, as to their construction, is in the use of the horse that its value principally consists. It may well be presumed then that when a horse is purchased that he is purchased for service, and it is with reference to his ability and fitness for service that the guarantee for soundness would be required, and given. We can see no reason for supposing that the future fitness or usefulness of the horse would be likely to be more an object of solicitude on the part of the purchaser than its present fitness, and when we consider the subject matter of such a guarantee we can see no reason to suppose that in such cases the purchaser would not require a general warranty of soundness. That at the time of the sale the animal is laboring under no disease or injury which at that time or afterwards does or will diminish his natural or ordinary usefulness or fitness for service.

WHAT CONSTITUTES A WARRANTY.

It is not necessary that any particular form of words should be used to create a warranty. The word "warrant" may not be used at all, nor the word soundness. Thus: The seller of the horse who says he is all right in every respect, or similar words, indicates and expresses a warranty. A statement at time of sale of the horse that the animal is of specified age, is a warranty that he is no older. But any statement that he is sound and right or sound and perfect will include a warranty. The statement that a horse is well broken might or might not include a warranty of gentleness, and the statement that a horse is sound every way, perfectly gentle, would not be a warranty that the horse is well broken or suitable to plow or do any other particular work.

The warranty should not be construed beyond its reasonable signification, thus: A bill of sale of one gray horse, five years old, which I warrant sound and kind, is a warranty of soundness and kindness only, and the first expression is a matter of description. Generally the mere affirmation that the horse is sound when exposed to sale and the purchaser's inspection, is not a warranty unless it is so intended by the parties, and care should be taken to have the matter properly understood; thus, in reply to the question as to the soundness of the horse, the reply is, I think the horse is sound, it does not mean a guarantee, nor the statement that the horse's eye is as good as any horse's eye in

the world. The statement by the seller of a horse, "that it is sound to the best of my knowledge," is not a warranty; nor bill of sale in which a horse is described, "as considered sound," but the statement that the horse is not lame, accompanied by the statement of the owner, that, "I would not be afraid to warrant him, was held to be enough to establish a warranty. (Quintard v. Newton, 5 Robertson, N. Y. 72.) If the horse is purchased for a particular purpose, and the seller knows of that particular purpose, and declares that the horse is all right, such a statement would amount to a warranty.

Any affirmation of an existing fact distinctly and positively made in negotiations for trade is deemed a warranty. (Sweet v. Bradley, 24 Barb. 549.)

Any representation of the thing sold, as a direct and express affirmation by the vendor of its quality and condition, may amount to a warranty. (Chapman v. Murch, 19 Johns. 290.)

But to constitute a warranty, it is essential that the affirmation at the time of sale should be intended for the party as a warranty, otherwise it is only a matter of opinion. (Sweet v. Colgate, 20 Johns. 196; but see Hawkins v. Pemberton, 51 N. Y. 198.)

A statement merely descriptive of the quality of the article does not amount to a warranty. (Greenthal v. Schneider, 52 How. Pr. 133.)

DEFECTS COVERED BY GENERAL WARRANTY.

In Vermont a farmer purchased a number of sheep, and the seller warranted the sheep sound and free from footrot; on the next day when the farmer went to pay for them, he discovered they were unsound, and the seller repeated his statements. It was held that the two interviews constituted one trade and one warranty. Judge Wilson, in deciding the case said: "It seems to me now well settled, that the rule of law which exempts a seller from liability upon a general warranty of soundness, where the defect is plainly visible and obvious to the senses, is not a question as to the apparent defect but power to understand the true nature and extent of which requires the aid of skill and judgment, nor is the rule applicable to the case where the seller has resorted to any means of representation in respect to the property intended or naturally calculated to throw the purchaser off his guard and induce him to omit such thorough examination of the condition of the property as he might, and very likely would have

made, if he had relied solely upon his own judgment in making the purchase. But the warranty may be so worded as to protect the purchaser against all consequences growing out of even an obvious defect. Thus: A farmer may bargain for a horse known to him to be afflicted in some way, but the seller agrees to deliver the horse at the end of ten days, free from blemish. It was held in that case that the warranty included the defect above mentioned. (*Liddard v. Kain*, 2 Bing. 183.) A general warranty of soundness does not extend to visible defects. This rule, however, does not extend to a visible defect, which could not be discerned by the ordinary observer, and where skill is required in its detection. (*Birdseye v. Frost*, 34 Barb. 367.)

Nor does a general warranty cover defects of which the purchaser had notice at the time of the agreement of purchase or acceptance of the property. (*Hinton v. Wilson*, 22 Weekly Digest, 90.)

A vendor of personal property is not liable for latent defects known to him, but unknown to the purchaser, unless he has used some artifice to deceive the purchaser in regard to such defects, or has warranted the article. (*McDonald v. Christie*, 42 Barb. 36.)

Where an article is warranted as fit for certain purposes, the seller is liable for the injury sustained by the vendee in consequence of its unfitness. (*Milburn v. Belloni*, 39 N. Y. 53.)

But a warranty of the fitness of an article for a specific purpose will not be implied from a knowledge on the part of the vender that it is intended for such purpose. (*Bartlett v. Hoppock*, 34 N. Y. 118.)

On the sale of an article known to be intended for food, there is an implied warranty that it is sound, wholesome and fit to be used as an article of food. (*Burch v. Spencer*, 15 Hun, 504.)

In every sale of a personal chattel, there is an implied warranty of title. (*Carman v. Trude*, 25 How. Pr. 440.)

A sound price does not imply a warranty of soundness. (*Hotchkiss v. Gage*, 26 Barb. 141.)

And this implied warranty of title extends to prior liens and incumbrances. (*Dresser v. Ainsworth*, 9 Barb. 619.)

This implied warranty of title does not extend to a case where the chattel is not in the possession of the vendor at the time of the sale. (*Scranton v. Clark*, 39 N. Y. 220.)

On the transfer of every negotiable security there is an implied warranty that it is genuine, and not tainted with usury. (*Herrick v. Whitney*, 15 Johns. 240; *Meridan Nat. Bank v. Galludet*, 120 N. Y. 298.)

DEFECTS WHICH CONSTITUTE UNSOUNDNESS OF HORSES.

Glanders, corns, bone-spavins, blindness or any organic defect, backing when a confirmed habit, biting when dangerous, crib-biting, affecting the health, have been held by various courts to constitute unsoundness. Bad formation which does not produce disease or lameness at the time of the sale is not usually considered unsoundness.

WATER RIGHTS.

Every owner of land upon a natural stream of water has a right to use the water for any reasonable purpose, if it does not interfere with similar rights that are vested in the owners of land above, below or beside him. He may take water to supply his dwelling or water his land, or for the use of his cattle, may use it for manufacturing purposes, such as running water wheels or supplying steam boilers, so long as the amount taken does not injuriously affect the volume, but it is the mere privilege that goes with the land and not the water itself. If the stream is very small and does not supply water more than enough to answer the natural wants of the different owners living on the stream, no one of them can use the water for free irrigation or manufacturing, thereby depriving the other owners of its use. But for domestic purposes or for watering stock, he would be justified in consuming all the water. Chief Justice Shaw states the general doctrine as follows: "Every person through whose land a flowage of water courses, such person has a right to the benefit of it, as it passes through his land, to all useful purposes to which it may be applied, and no proprietor of land on the same water-course has a right to prevent it from flowing through his premises, or obstructing it in passing them, or to curb or destroy it."

DIVERSION OF WATER.

Every person who owns land situated upon a stream has the following rights: First, to the natural flow of the stream; second, that the stream should continue to run in the natural channel; third, that it should flow upon his land in its usual quantity and its natural place; fourth, that it should flow off his land upon the land of his neighbor in its accustomed place and at its usual level. These rights he has and

cannot be deprived of them, so the owner of property should not make a change in the natural flow of the stream that would materially injure any other owner situated upon it, or interfere with the stream flowing as it is its wont to flow, or he will be responsible for the damage it will occasion. Of course these rights are subject to the privilege of each owner to make reasonable use of the water while it is passing through his land. A diversion of the stream may be made by the owner of the land if it is returned to its natural channel before it leaves his premises.

DIVERSION OF WATER BENEATH THE SURFACE.—If the owner of land, without any intention of injuring his neighbor, and while making use of his land for any lawful purpose, cuts off hidden currents, though he destroys altogether the use of water which has no visible course, but has been accustomed to flow into the land of his neighbor, an action cannot be maintained against him for the diversion or stoppage of such water. He may, therefore, drain the land, dig a well, open and work a mine, although by so doing he may cut off the supply of water of the springs and wells in his vicinity. But where the course of a stream is well known, and it leaves the surface at some point and flows for a distance beneath the surface, then emerges again, the owner of the land lower down upon the stream has the same right as he would have if the stream remained entirely above ground.

MILL PRIVILEGES.

A person who has a natural stream of water flowing through his land, has a right to use the water for mills, providing he does not cut off the water from those living lower down the stream, and he is not liable for an action for using and obstructing the water for his mill; for which it appears that the dam is of the size that is adapted to the capacity of the stream and quantity of water usually flowing therein, and that his mode of using the water is not unusual or unreasonable, and is in accordance with the general custom of the country in the case of dams upon similar streams. In many of the States laws have been passed encouraging the erection of mills by authorizing the owners and occupants, through condemnation proceedings, to take land of other persons by paying such damages as may be legally assessed.

CORRUPTION OF WATER.

Every owner of land through which a stream of water flows has a right to the use of the water in its natural state, and is liable if he renders the water unwholesome, or unfit for purposes for which it is used, unless he has acquired by grant, or otherwise, an adverse right against the lower or adjoining owner.

Erecting cess-pool or depositing manure, or obnoxious substance near the stream would be such a wrong.

An action for damages is not the only remedy for the unlawful pollution of a stream. The party thus wrongfully interfering may be restrained by an order of any court having jurisdiction.

EASEMENT OF DRIP.

When a land owner places a house on the line of his lot, and eaves project upon his neighbor's land, as to throw the water from the roof thereon, it is an encroachment upon the neighbor's lot to the extent at least of the projection. One adjoining owner cannot legally subject the lands of the other adjoining owner to the drip from eaves of his building.

LAND BOUNDED ON NAVIGABLE AND UNNAVIGABLE WATERS.

The owners of land bounded on navigable rivers where the tide ebbs and flows has a title to high-water mark. The land lying between high and low-water mark belongs to the State as trustee of the public, but in many of the States the deeds read to low-water mark. This point is settled by the law in the various States, and is not common to all, but as to streams not navigable which run by the side of a man's farm, the owner has title to the center of the stream. If the same person be owner of the land on both sides of the stream, he owns the whole stream to the extent of the length of his land upon it. But if by freshets the stream suddenly changes, the owner over whose lands the new channel is made, is entitled to the old boundary line as it existed before the freshet.

SURFACE WATER AND DRAINAGE.

The water which flows upon the surface of the land, not gathered in ponds or streams of running water, is usually designated "surface water." It is somewhat difficult to distinguish between surface water,

as such, and running water, and perhaps the best way to distinguish it is to ascertain what a running stream is. Where there is a channel or canal which is made by a general contour of the surrounding land from which the water is collected into one channel, it may be natural or artificial, it flows, however, in a definite channel having a bed and sides, and usually discharges itself into some other stream. The water need not flow continuously therein, as there are many large rivers which are sometimes dry, but they have a well-defined channel. The owner of the land has a right to the surface water which runs in no definite channel, and he may prevent its flow into a neighboring stream, thus: If there are two fields adjoining each other, one lower than the other, the owner of the upper field has a right to the water that flows on his land; he need not let it flow off from the same on the land below. The owner of the lower field, however, has no right to erect an embankment to stop the water from the upper field flowing upon it, nor has the owner of the upper field a right to divert the flow of water from its natural channel and cause it to make a new channel on the lower ground, nor can he collect into one large stream waters usually flowing off into his neighbor's fields by several streams, and thus increase the rush upon the lower field. The law has always recognized a distinction between the right of the owner to control the surface water which falls or collects on his lands and his right to control water of a natural water course; the owner of the land is admitted to have an absolute property in the surface water before it leaves his land and becomes a part of a definite water course and he may appropriate it to his own use or get rid of it in any way possible, provided he does not collect it and interfere with its flow as to injure adjoining owners.

EMPLOYER AND LABORER.

There is a difference in some respects between a person employed to work upon a farm or as a domestic servant and a person employed to work in a factory. The laws of the country have regulated the number of hours per day for many kinds of labor, but between the former laborer and the farmer the hours of labor rest wholly upon contract, express or implied. The laborer is bound to render the services and the farmer to pay the price agreed upon or the value thereof, if no arrangement is made as to the price. It is essential that the parties have the legal capacity to make a contract, otherwise the contract

could not be enforced, thus: if a boy under age hires for a specified time at a fixed price, he is not bound by his contract, but may abandon it at any time, although he cannot recover on his contract, yet he can recover what his services are actually worth, and that without any deduction for damages for his breach of contract. If there is no fixed period of employment agreed upon, the employer has the right to discharge a laborer, and the laborer has the right to leave at any time. If there is no special agreement as to the price, the employer must pay a reasonable value for the services, depending on the current rate of wages for similar services at the same time and place.

CONTRACTS FOR MORE THAN A YEAR.—Contracts for services which cannot be performed within a year, must, by the statute of frauds, be in writing, in order to be legally binding. In *Broadwell v. Getman*, 2 Denio, N. Y. 87, it was held that where it was agreed orally in the month of January to clear a piece of woodland and fence a part, one portion in one year from the ensuing spring, when the party who cleared the land was to put in the crop, which, with the wood and timber he was to have for his compensation. It was held that the contract was within the statute of frauds, and void, being an oral contract which was not to be wholly performed within the year.

If an oral contract is made to employ a laborer for a year, and the contract cannot be completed within the year, it is binding. But if the performance of such contract is to commence at some future day, it cannot be enforced, yet it seems that an oral contract in which a laborer was hired for the year, to begin the next day, is valid.

ENTICING A LABORER AWAY FROM HIS EMPLOYER.—When a person is employed to labor on the farm or do any other work and the person entices, hires or persuades the laborer to leave the services during the time of employment, the person who employs the help has the right of action for recovery of damages against the person who so enticed the laborer away, and for all inconvenience and losses thereby suffered by the employer. But attempting to entice a laborer away, unless damage is sustained, is not actionable; nor can an action be sustained for inducing a laborer to leave his employer's service at the end of the time for which he was hired, even though the laborer had no intention of leaving.

ABANDONING SERVICE WITHOUT CAUSE.—When a laborer is hired for a definite time, and before that time has expired he leaves without cause, or the consent of the employer, the laborer cannot recover any

part of his wages, because the contract is entire and performance is a condition precedent to a right of recovery. If a man agrees to work a year for another for a specified price per month, and by the terms of the agreement he is to be paid each month's wages at the end of each month, he may sue for and recover his wages at the end of the month.

ABANDONING SERVICE FOR CAUSE.—While a laborer has the right to abandon service for cause, if the cause is sufficient to render the contract voidable, he can collect his pay, yet he should not leave for trivial causes.

If the employer is to furnish board and lodging to the laborer as a part of his contract, and he is not furnished with sufficient or wholesome food or suitable or comfortable lodgings, and the employer treats him improperly by assaulting him, the laborer is justified in leaving. If he is compelled to work on Sunday, other than to do the necessary farm work, such as care of live animals, or the domestic servant in the house to prepare the meals, and properly care for the milk, or any act of the employer that is contrary to good morals, preventing reasonable comfort, safety and health, or that would injure the reputation of the laborer, would justify the employed to abandon the service. Harsh language to the laborer and a difficulty with a co-laborer would not justify the laborer in leaving. It is a question for the jury to decide whether the laborer had a reasonable excuse for leaving the service, and the burden of proof lays upon the laborer, who must establish the fact. There are a great many instances in which the laborer is justified in leaving the employer, but they could not all be enumerated here. In every case where there is a good cause the laborer may leave and compel the farmer to pay for the time that he has actually worked.

FARMER LIABLE ON LABORER'S CONTRACT.—Any contract made by the laborer in the course of his employment, about the farmer's business, is binding upon the farmer, provided it is within the scope of the authority conferred or implied from the employer's conduct. Thus: a house-maid is engaged to work about the house, she is in the habit of purchasing the family's supplies, and she buys such supplies in the name of the farmer, the farmer is compelled to pay for them, and if the laborer had no order to buy, or was in so buying defrauding her principal, and obtaining goods for herself, provided this was or had been the custom about the employer's place. But if a man is employed in farm work, and is not connected with the household work and has

never been permitted by the farmer to make any purchases, he could not bind the farmer by going to the store and buying goods simply because he was a laborer and pretending to have authority, or if he only had the authority and has purchased goods at a certain place, the employer will be bound by his acts, unless he notifies the parties from whom he had formerly purchased that he will be no longer responsible, yet the laborer who so purchased without the consent or directions of his employer is criminally liable.

LIABILITY OF EMPLOYER FOR INJURY COMMITTED BY HIS EMPLOYEE.—Where the employee is working within the scope of his employment, even though the farmer does not authorize or even know a laborer's act, he will be held responsible for any injury accruing through the negligence, fraud, deceit, or even willful misconduct of the laborer.

DISCHARGING FOR CAUSE.—Before the employer can discharge his laborer, there must be a sufficient cause to discharge the employer from liability for future wages, or justify the dismissal; there must be on the part of the laborer either willful disobedience of the lawful orders, or immoral conduct or habitual negligence. To illustrate—an instance of the first: If where a farmer ordered the laborer to go with his team a long distance just as dinner was ready and he refused to go until after he had had his dinner. But in most cases where the misconduct is slight and is the first offense there is a strong tendency to excuse the laborer. Still, willful disobedience of the lawful command, as well as insulting language used by the laborer is usually considered good ground for discharge. If the laborer is immoral or habitually drunk or embezzles or commits fraudulent acts towards his employer, his dismissal would be justifiable. Unwarranted absence or neglect in discharging his duties, thereby causing injury or loss to his employer, would justify the same course, even though the laborer did not intend to cause damage.

DISMISSING LABORERS.—In this country it has been repeatedly held that the employer must pay whatever the services were reasonably worth up to the time of discharge.

LIABILITY OF THE LABORER TO THE FARMER FOR MISCONDUCT.—If the laborer by negligence, carelessness or misconduct in doing the work, or executing orders, causes loss to the employer, he must reimburse the employer, or if a third person has recovered damages from the employer because of the acts of the employee, he must also pay for property willfully broken or damaged.

TERMINATION OF SERVICES.—The service that is dissolved at the

expiration of the term for which the person is hired, either by mutual consent, by the death of either party, or by the employed being unable to perform his duty on account of sickness or some permanent disability, the farmer must pay for the services rendered up to the time of the termination of the services, and in case of death, personal representatives of the laborer are entitled to recover from the employer what the services were reasonably worth.

BOUNDARIES AND FENCES.

Under the laws of all the States, every conveyance of land must be in writing, and this conveyance should accurately describe the land intended to be conveyed, so that its boundaries from the deed may be correctly determined, and so clear and comprehensive that the parcel conveyed may be distinguished and separated from all other land. If the description is hopelessly uncertain, the conveyance will be void and no title will pass. The boundaries are usually determined by monuments, courses, distances and quantity of land conveyed. The monuments will control courses and distances, and courses and distances will control the quantity of land. This, however, is not the invariable rule; natural monuments, naturally permanent, are the most reliable, such as trees, streams, ponds, and lakes, beaches and shores, and also walls, fences, streets and highways are regarded as reliable monuments. Frequently an adjoining lot or farm is referred to as a monument in the description of the land conveyed, and monuments consisting of stakes and stones, when placed, will control courses and distances.

The general rule is where land is described as bounded by a stream which is non-navigable the center of the stream is the line, and when described and bounded on the bank or shore of the stream, then the bank or shore is the boundary. If the stream is navigable, in which the tide ebbs and flows, the boundary is high-water mark on the shore. In those States in which there are large navigable rivers in which the tide does not ebb and flow, the boundary line is held to be low water mark; in either case the upland proprietor has a right as appurtenant to his land to erect wharves and piers extending to low-water mark, or into the channel of the stream, subject to the supervision of the government for the benefit of the public, and as an appurtenance to said lands, the owner has the right to a passageway to and from the main channel of the river. Lands bounded by arms of the sea run only to

high-water mark. Where land is bounded by a highway or street, where the State or municipality does not own the bed of the road and the description in the deed is "bounded on," "running along," "bounded by the highway," and the like, the boundary line is the center of the highway. If the land is described as bounded by the side of the street, or if there are other words in the description indicating an intent to exclude the soil of the street, then the near edge of the roadway will be the boundary. If a highway is referred to as the boundary, the actual line, as the road is laid out, will be taken as the true line of the street.

Where the boundary lines are made certain, they control the distance, directions and contents of the piece of land, unless there are discrepancies in the deed so great as to show fraud on one part or the other, or mistake. Parol evidence cannot be given to contradict a deed.

At the close of the description it is usual to add "be the same more or less," which is intended to protect the grantor in case the land conveyed should be less than the quantity specified, but this will be no protection where fraud or mistake can be shown with reference to the quantity of land intended to be conveyed.

In the State of New York it is provided by statute that where two or more persons have land adjoining, each of them shall make and maintain an equal proportion of the division fence between them. In all cases where such adjoining land shall be cleared or improved, or where each of the said adjoining lands shall border upon any of the navigable lakes, streams or rivers within this State, it is made the duty of the owners thereof to maintain the division fence down to the line of the low-water mark in such lakes, streams and rivers. And whenever such adjoining lands, one-half or more of which is improved, shall be bounded by or upon either bank of a stream of water, not navigable, the fence-viewers of the town in which the same are situated, shall direct, when required to do so by a party interested, upon which bank of such stream, and where upon such bank, the division fence shall be located, and the portion thereof to be kept and maintained by each of such adjoining owners.

If any person who is liable to contribute to the erection or reparation of a division fence shall neglect or refuse to make and maintain his proportion of such fence, or shall permit the same to be out of repair, he will be liable to pay to the party injured all damages caused thereby, and it is declared that he shall not be allowed to have and maintain any

action for damages resulting to his own lands, crops, fruit trees and shrubbery thereon, caused by the cattle of the adjoining owners passing over or through such defective fence.

The law authorizes the electors of a town to declare by resolution what shall be regarded as a lawful division fence. It is also provided by the statutes of the State of New York that railroad corporations and lessees of railroad corporations shall maintain fences on the sides of the road of the height and strength of the division fences as required by law, with openings and gates or bars therein, at the farm crossings of such railroad for the use of the proprietors of the lands adjoining such railroad, and shall also construct, where the same has not already been done, and shall hereafter maintain cattle guards at all crossings suitable and sufficient to prevent horses, cattle, sheep, and hogs, from getting on to such railroad. So long as such fences are not made or are not in good repair, the corporation or the lessees, or the persons in the possession of the road, shall be liable for all damages done by their agents or engines or cars to any domestic animal escaping thereon because of such failure. When made and in good repair, they shall not be liable for any such damages unless negligently or willfully done.

A sufficient post and wire fence of requisite height shall be deemed a lawful fence within the provisions of this section, but barbed wire shall not be used in its construction.

Every adjoining land owner who, or whose grantor has received compensation for fencing the land of land taken for a railroad, and has agreed to build and maintain a lawful fence along such line, shall build and maintain such fence. (Sec. 32, Chap. 565, Laws of 1890.)

OVERHANGING TREES.

A person owning a tree growing near a boundary line, though the roots extend into the land of an adjoining owner and derive nourishment therefrom, is the property of the owner of the land upon which the trunk stands, and such owner is entitled to the fruit produced upon the branches overhanging the adjoining lands. If force should be used by the adjoining owner to prevent the owner of the tree from reaching over and picking the fruit from the overhanging branches, he would have a right of action against the party so interfering with him. *Hoffman v. Armstrong*, 48 N. Y. 201, is a case where a lady whose father owned

some fruit trees stood upon the division fence and undertook to pick some cherries from the limb of a tree which hung over a neighbor's land. The neighbor forbade her taking the cherries, but she continued picking them and he attempted to prevent her by force, and did her a personal injury, for which she recovered a judgment of \$1,000.

If it falls from the overhanging tree on to a neighbor's land, it still belongs to the owner of the tree, though he might be liable for trespass in going upon a neighbor's land to gather it. In such action the recovery cannot include anything more than the actual injury to the premises upon which the owner of the fruit entered without permission.

Branches overhanging the boundary line may be cut off up to the line, but belong to the party who owns the tree, and the person cutting them off, if he use them, will be obliged to pay such owner for them.

A tree standing upon a boundary line, so that part of its trunk is upon each side of the line, belongs to the adjoining owners in common, neither is at liberty to cut the tree without the consent of the other, nor to cut away a part which extends into his land if by so doing he injures the common property. (*Dubois v. Beaver*, 25 N. Y. 123.) The ownership of land includes everything beneath and above the surface, with the right to the enjoyment in such a manner as he may see fit so long as such use does not interfere with a similar right which belongs to his neighbor of enjoyment of his lands. An adjoining owner has not the right to maintain upon his lands a nuisance which would prevent an adjoining owner from the enjoyment of rights which belong to him.

One owner may be restrained from keeping swarms of bees so near the division line as to interfere with and prevent the proper use and enjoyment of the lands of the adjoining owner.

A person may plant shade trees upon his own lands, cover them with a thick forest if he desire, and the owner of adjoining lands, though he may have a house near the boundary line, has no right of action against the owner of the trees if the house of the adjoining owner is made damp and unhealthy thereby.

TREES POISONOUS TO ANIMALS.—The owner of a farm is liable for damage caused by a tree that is poisonous to animals, where the branches hang over the division line and poison cattle or sheep upon the adjoining land; but if cattle break through the fence, which belongs to the owner of the cattle to build and maintain, and escapes to poisonous trees which are distant from the boundary line, and are injured

thereby, the owner of the land is not liable because the cattle are wrongfully upon the premises.

In New York it is provided by statute, Chap. 501, Laws of 1892, that it shall be unlawful for any person knowing or willfully to keep any plum, cherry or other trees infected with the contagious disease or fungus known as the "Black Knot." And every tree so infected is declared to be a public nuisance and may be destroyed by order of the commissioner appointed under the act, and whenever any person owning or in possession of any such trees shall neglect or refuse to comply with the order of the commissioner directing him to destroy the same within the time specified in the notice, he may be deemed guilty of a misdemeanor and punished by a fine not exceeding twenty-five dollars, or by imprisonment in the county jail not exceeding ten days, or both, in the discretion of the court, and any justice of the peace in a town or city in which said offense shall be committed shall have jurisdiction thereof.

THE LAW IN REGARD TO MANURE.—As between grantor and grantee, lessor and lessee of farm lands, manure made upon the premises from the produce raised thereon goes with the land as a part of the realty, and is not personal property. This is upon the theory that it is necessary that it should so remain in order to maintain the productiveness of the soil. Judge Eastman, in *Plummer v. Plummer*, 30 N. H. 558, states the law in that State as follows: "It must be regarded as settled in this State, that between the grantor and the grantee, all manure made in the ordinary course of carrying on the farm, and which is upon the place at the time of sale and conveyance, would pass to the purchaser, unless there be a reservation in the deed; and that it makes no difference whether it is in the field, in the yard, or in heaps around the house, or under cover, it belongs to the land and passes with it like fallen timber and trees, and loose stones lying upon the surface of the earth, and like the wooden fences erected upon the land and the material of such fences when placed upon the ground for use or accidentally fallen down." This is the law in the State of New York. In New Jersey, it was held in *Ruckman v. Outwater*, 4 Dutch. 581, to be personal property and not to pass with the real estate.

The rule is different where manure is made in a livery stable, village lot, or in any manner not connected with agriculture, or made from products not produced upon a farm, nor made in connection with its cultivation or occupancy as a farm. In such case the manure belongs

to the person producing it, and he has a right to dispose of it as he pleases, the same as any other personal property.

ESCAPED CATTLE UPON ADJOINING PREMISES WHEN DRIVEN ALONG THE HIGHWAY.—While the owner is driving cattle along the highway and they escape to the adjacent lands, and the owner of the cattle pursues them and drives them off as soon as possible, such an entry upon the premises is but an involuntary trespass for which the owner of the cattle should not be liable. (*Rightmire v. Shepard*, 36 N. Y. St. Reporter, 768; *The Tonawanda R. R. Co. v. Munger*, 5 Denio, 255; *z* *Waterman on Trespass*, sec. 872.

BARBED-WIRE FENCE.

The statutes of the State of New York provide, Chap. 755, Laws of 1894, that "Barbed wire cannot be used in the construction of any division fence constructed or built after September 1st, 1895, unless the person, association or corporation desiring to use such material, shall first obtain the written consent of the owner of the adjoining property that it may be used."

Any person, association or corporation who shall construct or build a division fence contrary to the provisions of this act, or who shall maintain such fence after so constructing or building the same, shall forfeit and pay to such adjoining owner or other person occupying such adjoining property treble damages for all injuries occasioned to him thereby.

In the case of *Rowland v. Baird*, 18 Abb. N. C. 256, it was held that a barbed-wire fence erected upon or near the division line is calculated to cause serious injury and damage to the animals of the adjoining owner, and is a nuisance rendering the owner liable for such injury.

In the case of *Rooney v. Aldrich*, 44 Hun, 320, it was held: The owner of a farm is liable for injury to animals upon an adjoining farm by reason of his agent's negligence in the construction of a wire fence, which he, according to agreement, was bound to maintain. "A person is not liable in damages for building a high fence on his own land which darkens his neighbor's windows, and this without regard to his motive." (*Pickard v. Collins*, 23 Barb. 444.)

GLOSSARY.

- AB-LAC-TA-TION.** A weaning or cessation from suckling.
- AB-DO-MEN.** The part of the body below the diaphragm, which contains the stomach, liver, and intestines.
- AB-LU-TION.** Washing or cleansing the external part of the body.
- AB-NOR-MAL.** That which is not natural nor regular. Contrary to nature.
- A-BOR-TION.** The casting of young before the proper time. If the young is cast at a time previous to full foetal development, yet is capable of living, it is called a premature birth.
- A-BRA-SION.** A wearing away by contact or rubbing, as rubbing off the surface of the skin, often producing galls.
- AB-RUPT.** Quick, sudden; an abrupt turn or twist in the intestines may cause strangulation of the parts.
- AB-SCISS.** A swelling and its cavity containing pus or matter. A cavity containing pus.
- AB-SORB-ENT.** In anatomy those glands and vessels which imbibe or suck up liquids, as the lacteals. In medicine any substance that absorbs either liquid or acid. As absorbent cotton, used to take up and hold the liquid produced by blisters, and chalk and magnesia used to absorb the acid in the stomach.
- A-CHO-LI-A.** A deficiency of bile.
- A-CID.** Sour, sharp, or biting to the taste. The last fermentation before the putrid.
- A-CID-U-LATE.** To make slightly sour, as with lemons, vinegar, or any other acid.
- AC-RID.** Very sharp, pungent, biting, irritating, as the strong acids.
- A-CUTE.** Severe, sharp. In diseases, those which run a course and end; in contra-distinction to chronic.
- AC-TUAL CAU-TER-Y.** The production of an immediate effect, by searing or burning with a hot iron. In contra-distinction to the effect of escharotic (blister) as a caustic application.

- AD-HE-SIVE.** Sticky, tenacious. A plaster used to stick to the edges of a wound and hold them in position is called an Adhesive Plaster.
- AD-I-POSE.** Matter, membrane or tissue. Usually applied to the fatty tissues of the body.
- AD-JU-VANT.** A substance added to a prescription to aid the operation of the principal ingredient.
- AL-BU-MEN.** An essential constituent of animal bodies. The white of an egg is nearly all pure albumen.
- AL-I-MEN-TA-RY CA-NAL.** The tube or passage through the body to convey the food. It consists of the mouth, pharynx, esophagus, stomach, (stomachs in ruminants) small and large intestines.
- AL-KA-LI.** A substance that neutralizes acids by uniting them. An alkaline substance will turn red litmus to blue.
- AL-TER-A-TIVE.** A remedy that changes a morbid condition of the functions into one of health. A medicine that restores healthy functions without sensible evacuations of the bowels, or other sensible secretions.
- AL-VE-O-LAR PRO-CESS.** The part of the maxillary bones into which the teeth are inserted.
- AM-NI-OT-IC LIQ-UID.** The fluid surrounding the the foetus in the womb. The amniotic sac is the sac containing the foetus.
- AN-ES-THET-IC.** That which produces insensibility to pain. Chloroform, ether, opium, etc.
- AN-EU-RISM.** A soft pulsating, hollow tumor, containing blood arising from an enlargement or rupture of the walls of an artery. When in the brain it causes paralysis.
- AN-O-DYNE.** Any medicine that eases pain, as a narcotic or opiate; anything that soothes disturbed functions and feelings.
- ANT-AC-ID.** A substance that neutralizes acids. In medicine a remedy for acidity of the stomach, often called an absorbent.
- AN-THEL-MIN-TIC.** A medicine used to destroy or expel worms from the body.
- AN-THRAX.** A malignant pustule or carbuncle. It is also used to designate an infectious disease of sheep and cattle. It may be transmitted to man by means of sores on his hands or body coming in contact with the spores of the disease.
- AN-TI-DOTE.** A remedy to counteract the effect of poisons, or of anything noxious taken into the stomach.

- AN-TI-SEP-TIC.** Anything that counteracts or prevents putrefaction or decay. There are spores in the air that attack wounds and cause rotting or putrefaction. Antiseptic surgery uses applications to prevent these spores from living in the wounds.
- AN-TI-SPAS-MOD-IC.** Medicines that relieve spasms, such as cramps and convulsions.
- A-NUS.** The posterior opening of the alimentary canal, through which the excrements are expelled.
- A-OR-TA.** The great artery which carries the blood from the heart to all parts of the body except the lungs; the main trunk of the arterial system.
- A-PE-RI-ENT.** A medicine that gently moves or opens the bowels; simply a laxative.
- AR-O-MAT-IC.** A plant, drug, or medicine characterized by a fragrant smell, and usually by a warm pungent taste, as ginger, cinnamon and spices.
- AS-CAR-I-DES.** A parasitic worm often occurring in the human intestines also in the domestic animals.
- AS-CI-TES.** Dropsy of the peritoneum. A collection of serous fluid in the cavity of the abdomen.
- AS-PHYX-IA.** Apparent death or suspended animation; the condition which results from drowning or inhaling irrespirable or poisonous gases. See Carbon-monoxide.
- AS-SIM-I-LA-TION.** The changing of nutriment into the fluid or solid substance of the body, by the processes of digestion and absorption, whether in plants or animals.
- AS-TRIN-GEN-T.** A medicine or other substance that produces contraction in the soft organic textures, and checks the discharges of blood, mucus, etc.
- AU-RI-CLES.** The two chambers of the heart into which the blood is received and transmitted to the ventricles, from which it is forced through the arteries to the various parts of the body.
- AUS-CUL-TA-TION.** An examination by listening either directly by applying the ear to the parts of the body, as the chest or abdomen, or with the stethoscope, in order to distinguish sounds recognized as a sign of health or disease.
- BAL-SAM-ICS.** Medicines employed for healing purposes. Soft, soothing, mitigating remedies.

- BIL-IA-RY.** Relating or belonging to bile. Biliary calculus, a gall-stone or a concretion formed in the gall bladder or gall ducts.
- BLIS-TER.** A thin bladder on the skin, containing watery matter or serum. It may be occasioned by a burn or other injury or by a vesicatory. Also applied to the plaster of Spanish fly or other matter used to raise the blister.
- BOU-GIE.** A long, flexible instrument, that is introduced into the urethra, esophagus, etc., to remove obstructions or keep the duct open or to enlarge it.
- BRIGHT'S DIS-EASE.** An affection of the kidneys usually inflammatory in character, and distinguished by the occurrence of albumen and renal casts in the urine. Named after Dr. Bright of London who first described it.
- BRON-CHI.** The plural of bronchus. The bronchi consist of two primary subdivisions of the trachea or windpipe.
- BRON-CHI-AL.** Pertaining to the bronchi. Bronchial arteries, branches of the descending aorta that accompany the bronchi in all their divisions. Bronchial cells, the air cells terminating the bronchi. Bronchial tubes, usually applied to the secondary and other subdivisions of the bronchi.
- CAL-CU-LI.** Any solid concretion found in any part of the body, but most frequently found in some hollow organ that acts as a reservoir. Calculi in the stomach, often found in miller's horses, and biliary calculi, found, in gall bladders and bile ducts, and urinary calculi, found in the kidneys and bladder.
- CAN-NU-LA.** A small tube of metal, wood, or India rubber used for various purposes, especially for withdrawing liquids and allowing gases to escape. It is usually accompanied with a trocar, a sharp pointed instrument which just fills the opening of the tube. After insertion the trocar is withdrawn, which allows the liquid or gas to pass through the hollow tube.
- CAP-IL-LA-RY.** A minute thin walled vessel, which holds both arteries and veins. In these minute vessels the blood gives off its oxygen which unites with the carbon of the surrounding tissues forming carbon-dioxide, thus producing heat. The blood thus being changed from arterial to venous (red to blue). Here is also deposited the nourishment that unites with the various tissues causing them to be renewed, and from these organs the blood receives the waste material of tissues.

CAR-BON-DI-OX-IDE. The result of the union of oxygen and carbon in complete combustion. Two parts of oxygen uniting with one part of carbon. It is the gas which is found in wells and mines, and is produced and given off by burning of kerosene and oil lamps. It is also given off from the lungs while breathing. It is colorless gas, slightly heavier than air, and will produce suffocation and death if the air contains a large percentage of the gas. Large lamps and oil-stoves burning in a room, require a large amount of ventilation to keep the air pure.

CAR-BON-MO-NOX-IDE. This is also a union of carbon and oxygen, but is formed as a product of partial combustion, as when the dampers of a coal stove are closed and not enough oxygen is supplied for complete combustion. It is seen above the coal in a blue flame. It will penetrate even iron, is poisonous and very dangerous. Avoid closing the dampers in the stove pipes as this often causes it to pass out into the room during the night, causing the sleeping persons to become asphyxiated.

CA-RI-ES. Ulceration of the bone. A process in which the bone is carried away in pieces, in contra-distinction to Necrosis in which it dies in masses.

CAR-MIN-A-TIVE. A medicine especially an aromatic which tends to expel wind from the alimentary canal or to relieve colic, griping or flatulence.

CA-ROT-ID AR-TE-RIES. The two main arteries of the neck, by which the blood is conveyed from the aorta to the head. They are divided into the right and the left.

CAT-A-PLASM. A soft and moist substance applied externally to some part of the body; a poultice.

CA-TARRH. Any inflammatory affection of any mucous membranes, in which there are congestion, swelling, and an alteration of the secretions, as catarrh or cold in the head, catarrh of the stomach, catarrh of the bladder, etc.

CA-THAR-TIC. A medicine that promotes discharges from the bowels, a purge; a purgative of moderate activity.

CATH-E-TER. The name of various instruments for passing into mucous canals, especially applied to the tubular instrument to be introduced into the bladder through the urethra to draw off the urine.

CAUS-TIC. Any substance which, when applied to flesh of animals will burn, corrode, or destroy it by chemical action; an escharotic.

- CAU-TER-Y.** A burning or searing of morbid flesh, with a hot iron, or by application of a caustic that will burn, corrode or destroy the animal tissue. Also applied to the iron or agent used in cauterizing.
- CER-E-BRO-SPI-NAL.** Pertaining to the central nervous system, consisting of the brain and spinal cord.
- CHOL-A-GOGUE.** A medicine that promotes the discharge of bile from the system.
- CHRON-IC.** A disease that is of long continuance or progresses slowly, in distinction from an acute disease which speedily terminates.
- CI-CA-TRIX.** The part that forms over a wound or break in continuity and completes the process of healing. It subsequently contracts and becomes white, forming a scar.
- CLYS-TER.** A liquid injected into the lower intestines; a rectum injection; an enema.
- CO-LON.** The part of the large intestines which extends from the cæcum to the rectum.
- CON-GES-TION.** An overfullness of the capillary and other blood-vessels, in any locality or organ.
- CON-STI-PA-TION.** A state of the bowels in which the evacuations are infrequent and difficult, or the intestines become clogged with waste matter.
- COR-RO-SIVE.** Medically it is those substances which act either directly by destroying the parts or indirectly by causing inflammation and gangrene.
- COUN-TER-IR-RI-TA-TION.** To cause irritation in one part to relieve disease in another.
- DE-COC-TIONS.** An extract of the virtues of a body obtained by boiling it in water.
- DEG-LU-TI-TION.** The act or process of swallowing food; the power of swallowing.
- DEL-E-TE-RI-OUS.** That which is hurtful, noxious, destructive, or pernicious. Liable to do injury.
- DE-MUL-CENTS.** Substances usually of a mucilaginous or oily nature. Supposed to be capable of soothing an inflamed membrane. Gum Arabic, glycerine, and olive oil are demulcents.
- DI-A-PHO-RET-ICS.** Those that increase the insensible perspiration. They differ from Sudorifics as the latter increases the sensible perspiration or sweat.

- DIS-CU-TIENT.** Medicine that serves to disperse morbid matter. Any remedy that serves to scatter a swelling or tumor or any coagulated fluid of the blood.
- DIS-IN-FEC-TANT.** An agent that chemically destroys infectious, contagious or deleterious matter.
- DI-U-RET-ICS.** A medicine that increases the secretion of urine.
- E-LEC-TU-ARY.** A medicine composed of powder or other ingredients mixed with honey or syrups.
- E-MA-CI-A-TED.** The state of being reduced to an excessively lean condition. Wasted away in flesh.
- EM-BRY-O.** The young of an animal in the womb, or more specifically, before its parts are developed and it becomes a foetus.
- EM-MEN-A-GOGUE.** A medicine that promotes or hastens the menstrual discharge.
- EN-TE-RI-TIS.** A inflammation of the intestines.
- EP-I-GLOT-TIS.** A lidlike cartilage that closes over the glottis while food or drink is passing through the pharynx. It is open except when pressed back or down in the act of swallowing. It is only found in mammals.
- EP-I-THE-LI-UM.** The superficial layer of cells lining the alimentary canal and all its appendages, all glands and ducts, blood vessels and lymphatics. It is often used to include the epidermis and it is sometimes restricted to the alimentary canal.
- EX-UC-TA-TION.** The act of belching or gulping wind or gases from the stomach.
- ES-CHA-ROT-IC.** A substance that produces a dry slough, crust or scab which separates from the healthy part of the body, as that produced by a burn or the application of caustics.
- EX-AC-ER-BA-TION.** A periodical increase of violence in a disease, as in remittent or continuous fever; an increased energy of disease and painful action.
- EX-CRE-MENT.** Matter separated and thrown off from the body; that which is cast out of the animal body by any of the natural organs which serve to carry off waste matter. Used with special reference to alvine discharges; dung.
- EX-PEC-TO-RANT.** A medicine that tends to promote discharges of mucus from the lungs or throat.
- EX-U-DA-TION.** The act of discharging through pores or incisions; as moisture, sweat or other liquid matter.

- HÆC-TIC.** Habitual; constitutional; having reference to slow waste of animal tissue as in consumption.
- HEM-OR-RHAGE.** Any discharge of blood from the blood vessels, caused by their rupture.
- HEM-OR-RHOIDS.** Livid and painful swellings formed by the dilation of the blood vessels around the margin of, or within, the anus, from which blood or mucus is occasionally discharged; commonly called piles.
- HE-PAT-IC.** Relating to the liver; as hepatic artery; hepatic diseases. In anatomy hepatic duct is any biliary duct, which carries or contains bile, but especially used with reference to the duct that carries the bile from the liver to the cystic and common bile ducts.
- HER-BA-CEOUS.** Of or pertaining to herbs; having the nature, textures or characteristics of an herb.
- HE-RED-I-TARY.** Descended or capable of descending from an ancestor. Transmitted or capable of being transmitted, as a constitutional quality or condition from an ancestor to its progeny.
- HER-NIA.** A protrusion, consisting of an organ or part which has escaped from its natural cavity, and projects through some natural or accidental opening to the cavity. Also called rupture.
- HER-PES.** An eruption of the skin, taking various names according to its form, or the part affected; especially, an eruption of vesicles in small distinct clusters, accompanied with itching as seen in shingles and ring-worm.
- HY-DRA-GOGUE.** A medicine causing a watery discharge of the bowels.
- HYP-NOT-IC.** Any agent that produces, or tends to produce, sleep; an opiate; a soporific; a narcotic.
- HY-PO-DER-MIC.** Having reference to the application of remedies under the skin, by means of injection.
- LACH-RY-MAL.** Pertaining to, or secreting, tears, as, the lachrymal glands. Pertaining to the lachrymal organs; as, lachrymal bone; lachrymal duct.
- LAC-TA-TION.** A giving suck; the secretion and yielding of milk by the mammary glands.
- FÆ-CES.** The excrement that passes out of the body through the anus. It is the waste matter of the food not taken up by absorption as it passes along the alimentary canal, and other waste matter formed during digestion.
- FEB-RI-FUGE.** A medicine serving to mitigate or remove fever.

- FET-ID.** Having an offensive smell; stinking.
- FÆ-TUS.** Also spelled Fetus. The young or embryo of an animal in the womb or in the egg; often restricted to the latter stages in the development. The term embryo being applied to the earlier stages.
- FUN-GUS.** A low class of plants of which plant rust, mold, smut, and mildew are examples. In medicine a spongy morbid growth, or granulation in animals, as the proud flesh of wounds.
- GAN-GLI-ON.** A mass or knot of nervous matter, including nerve cells, usually forming an enlargement in the course of a nerve. Also applied to a globular, hard, indolent tumor situated on a tendon.
- GAN-GRENE.** A term formerly used only with reference to mortification of the soft tissues, which have not advanced so far as to produce complete loss of vitality; but now applied to mortification of the soft parts in any stage.
- GAS-TRI-TIS.** Inflammation of the mucous membrane of the stomach, sometimes extending to the muscular coats.
- GES-TA-TION.** The act of carrying young in the body from time of conception to birth. It varies very widely in the different animals.
- GLOT-TIS.** The opening from the pharynx (the back part of the mouth) into the larynx or into the trachea. The opening is protected by a cartilage called the epiglottis which closes when food or liquids pass over it on their way to the stomach.
- GRAN-U-LA-TION.** In anatomy, it refers to the small, red, grain-like prominences which form on the raw surface of wounds or ulcers, and are the efficient agents in the process of healing.
- GUT-TER-AL.** Of or pertaining to the throat; formed in the throat; relating to or characteristic of a sound formed in the throat.
- I-CHOR.** A thin, acrid, watery, serous discharge from an ulcer, sore, wound, etc.
- IL-E-UM.** The last and usually the longest division of the small intestine; it commences at the end of the jejunum and ends at the large intestine.
- IN-A-NI-TION.** The condition of being empty; a want of fullness as in vessels of the body; hence an exhaustion from want of food, either from partial or complete starvation; or from a disorder of the digestive apparatus producing the same effect.
- IN-CI-SORS.** The teeth in front that are sharp and used in cutting and biting off the food.

- IN-FEC-TION.** This term is often used in a definite and limited sense of the transmission of affections which are transmitted without direct contact of individuals or immediate application or introduction of the disease, in contradistinction to contagion which implies transmission by direct contact.
- IN-FLAM-MA-TION.** A morbid condition of any part of the body consisting in congestion of the blood vessels, with obstruction of the blood current and the growth of morbid tissue. It is shown outwardly by redness and swelling, attended with heat and pain.
- IN-GES-TION.** The act of taking into the alimentary canal. In medicine it refers to that condition in which the food is clogged or remains without passing on in its natural course.
- IN-OC-U-LA-TION.** The communicating of disease to an animal in health by inserting contagious matter in the skin or flesh.
- IN-TER-COS-TAL.** Between the ribs; pertaining to, or produced by, the parts between the ribs.
- LAR-YNX.** The expanded upper end of the windpipe. It is connected with the pharynx by an opening, the glottis, which in mammals is protected by a lidlike epiglottis.
- LAX-A-TIVE.** Having the effect of loosening or opening the intestines, and relieving from constipation; opposite of astringent. See Cathartic.
- LE-SION.** A hurt; an injury. Any morbid change in the exercise of functions or the texture of organs.
- LEU-COR-RHŒ-A.** A discharge of a whitish, yellowish, or greenish viscid mucus, resulting from inflammation or irritation of the membrane lining the genital organs of the female; the whites.
- LIG-A-TURE.** A thread or string for tying the blood vessels, particularly the arteries to prevent hemorrhage.
- LITH-ON-TRIP-TIC.** Having the quality or used for dissolving or destroying stone in the bladder or kidneys. A lithontriptic remedy or agent, as distilled water.
- LI-THOT-O-MY.** The operation, art, or practice of cutting for stone in the bladder.
- LUM-BA-GO.** A rheumatism or rheumatic pain in the loins and the "small of the back."
- LYM-PHAT-IC.** Having reference to the absorbent vessels, which carry lymph and discharge it into the veins; lymph duct; and lymphatic duct.

- MA-LIG-NANT.** Tending to produce death; threatening a fatal issue. Malignant pustule, a very contagious disease transmitted to man from animals. It is marked by great exhaustion and is usually fatal. Called also Carbon and Anthrax.
- ME-DUL-LA OB-LON-GA-TA.** The posterior part of the brain connected with the spinal cord. It controls very largely respiration, circulation, swallowing, and other functions, and is the most vital part of the brain.
- ME-TAS-TA-SIS.** The change in the location of a disease, as from one part to another.
- MU-CUS.** A viscid fluid secreted by mucous membranes, which it serves to moisten and protect. The Mucous membrane lines all the cavities which open externally; such as the mouth, nose, lungs, intestines, urinary passages, etc.
- NAR-COT-ICS.** Drugs which in medicinal doses, relieve pain and produce sleep; but which in poisonous doses, produce stupor, coma, or convulsions, and when given in sufficient quantities produce death. The best examples are opium, morphine, belladonna, and conium.
- NAU-SE-A.** A sickness of the stomach accompanied with a desire to vomit; squeamishness of the stomach.
- NE-PHRIT-IC.** A medicine adapted to relieve or cure diseases of the kidneys. Nephritis: an inflammation of the kidneys.
- NEU-RAS-THE-NIA.** A condition of nervous debility supposed to be dependent upon impairment in the functions of the spinal cord.
- NOR-MAL.** According to an established form, rule, or principle; conformed to a type, standard, or regular form; performing the proper functions; not abnormal, but regular and natural.
- Œ-DE-MA.** A swelling from effusion of fluid in the cellular tissue beneath the skin or mucous membrane; dropsy of the subcutaneous cellular tissue.
- OL-FAC-TO-RY OR-GANS.** The organs that are connected with the sense of smell; as the olfactory; the olfactory cells.
- O-MEN-TUM.** A free fold of the peritoneum, or the one serving to connect viscera, support blood vessels, etc.
- OPH-THAL-MI-A.** An inflammation of the membrane or coats of the eye or of the eyeball.
- OR-THOP-NŒ-A.** A morbid condition in which the respiration can be performed only in an erect posture; by extension in the use of the word any difficulty, of breathing.

- OS-SI-FY. To form into bone; to change from a soft animal substance into bone, as by the deposition of lime salts.
- O-VUM. The transparent mass of cells formed of protoplasm from which develops a new individual like the parent; an egg, spore, germ, or germ cell.
- PAL-PI-TA-TION. A rapid pulsation; a throbbing; especially an abnormal, rapid beating of the heart, as when excited by violent exertion, strong emotion, or disease.
- PAN-A-CE-A. A remedy for all diseases; a universal remedy; a cure-all, hence a relief or solace for affliction.
- PA-PIL-LA. Any minute nipplelike projection; as the papilla of the tongue.
- PAR-A-CEN-TE-SIS. The perforation of a cavity of the body with a trocar, aspirator, or other suitable instrument, for the evacuation of fluid, pus, or gas.
- PA-RAL-Y-SIS. Either complete or partial loss of voluntary motion with or without loss of feeling.
- PAR-OX-YSM. The fit, or attack, of a disease that occurs at intervals, or has decided remissions or intermissions.
- PEC-TO-RAL. Relating to, or good for, diseases of the chests or lungs.
- PER-I-CAR-DI-UM. The double baglike fold of serous membrane which incloses the heart. The inner layer that is closely adherent to the heart is called the cardiac pericardium, the outside layer is called the parietal pericardium.
- PER-I-NE-UM. The region which is included within the outlet of the pelvis, and is traversed by the urino-genital canal and the rectum.
- PER-I-OS-TE-UM. The membrane of fibrous connective tissue which closely invests all bones except at the articulating surfaces.
- PER-I-TO-NE-UM. The smooth serous membrane which lines the cavity of the abdomen or the whole body cavity where there is no diaphragm, and turning back surrounds the viscera, forming a closed or nearly closed sac. Inflammation of this membrane is called peritonitis.
- PHAG-E-DEN-IC. Pertaining to, having reference to, a canine appetite. Refers to a medicine used in the treatment of phagedena.
- PHLEG-MAT-IC. Used in reference to those animals or functions of animals that are not easily excited to action, or passion; cold; dull; sluggish; heavy.
- PHLO-GIS-TIC. Inflammation; belonging to inflammation and fever.

- PLE-THOR-IC.** Having a full body, characterized by an excess of blood; overfullness. The state of the system when the blood exceeds a healthy standard in quantity.
- PLEU-RA.** The smooth double serous membrane which closely covers the lungs and the adjacent surfaces of the thorax.
- PLEU-RI-SY.** An inflammation of the pleura, usually accompanied with fever, pain, difficult respiration, and cough, and with exudation into the pleura cavity.
- PNEU-MO-NI-A.** Inflammation of the lung tissue, associated with catarrh and with marked evidences of inflammation of bronchial membranes.
- PROG-NO-NIS.** The act or art of foretelling the course and termination of a disease; also used with reference to the outlook afforded by this judgment.
- PROPH-Y-LAC-TIC.** A medicine which preserves or defends against disease; a preventive. Modern methods pay much more attention to prophylactic, anæsthetic, and disinfectant treatment than formerly, thus often being able to prevent the spread of very contagious or infectious diseases.
- PTY-A-LISM.** Salivation or an excessive flow of saliva.
- PUL-MO-NA-RY.** Of and pertaining to the lungs; affecting the lungs.
- PUR-GA-TIVE.** A medicine having the power or quality of separating or carrying off impurities. A very active cathartic.
- PUS.** The yellowish white opaque creamy matter produced by the process of suppuration. If absorbed into the system in quantities it produces blood-poisoning.
- REC-TUM.** The terminal part of the large intestine. So named because it was supposed by the old anatomists to be straight.
- RE-FRIG-ER-ANT.** A medicine or an application for allaying fever, or the symptoms of fever.
- RE-SOLV-ENT.** That which has power to disburse inflammatory or other tumors; a discutient; anything that aids the absorption of effused products.
- RU-BE-FA-CIENTS.** An external application which produces redness of the skin. That which irritates but not blisters.
- SAL-I-VA-RY GLANDS.** The glands situated in front of the ears (parotid), and under the lower jaw bones (sub-maxillary), and under the tongue (sub-lingual), which secrete the saliva. They occur in pairs, one of each kind on each side.

- SAN-A-TIVE.** Having the power to heal; curative; healing; tending to heal; sanatory.
- SCIR-RHUS.** A cancerous tumor which is hard, translucent, of a gray or bluish color, and emits a creaking sound when incised.
- SCRO-TUM.** The bag or pouch which contains the testicles, the organs in which the semen is generated.
- SED-A-TIVE.** A remedy which allays irritability and irritation; and irritative activity or pain.
- SE-ROUS.** Applied to membranes which line and surround centres of the body which do not open directly with the surface.
- SI-AL-O-GOGUE.** A medicine that promotes the secretion of saliva by the salivary glands.
- SIN-A-PISM.** A plaster or poultice composed principally of powdered mustard seed or containing the volatile oil of mustard seed. It is a powerful irritant.
- SLOUGH-ING.** The dead matter separating from a foul sore; the dead part separating from the living tissues in mortification.
- SPE-CIF-IC.** A medicine that exerts a peculiar influence over any part of the body; preventing or curing diseases by a peculiar adaptation and not on general principles.
- STO-MACH-IC.** A medicine that strengthens the stomach and increases its action. Notice the difference between this word and stomatic.
- STO-MAT-IC.** A medicine for diseases of the mouth.
- STRAN-GU-RY.** A painful discharge of urine, drop by drop, produced by spasmodic muscular contraction.
- SU-DOR-IF-IC.** A medicine that increases the action of the sweat glands, thus producing sweating.
- SUP-PU-RA-TION.** The act or process of generating pus.
- SYN-CO-PE.** The state of fainting or swooning. Loss of consciousness owing to a sudden arrest of the blood supply to the brain, the face becoming pallid, the respiration feeble and the heart's beat weak.
- TEN-DON.** A tough insensible cord, bundle or band of fibrous connective tissue uniting a muscle with some other part; a sinew.
- TES-TI-CLES.** The essential male genital glands which secrete the semen.
- TET-AN-US.** A painful and usually fatal disease, resulting generally from a wound, and having as its principal symptom persistent spasm of the voluntary muscles. When the muscles of the lower jaw are affected it is called Lockjaw.

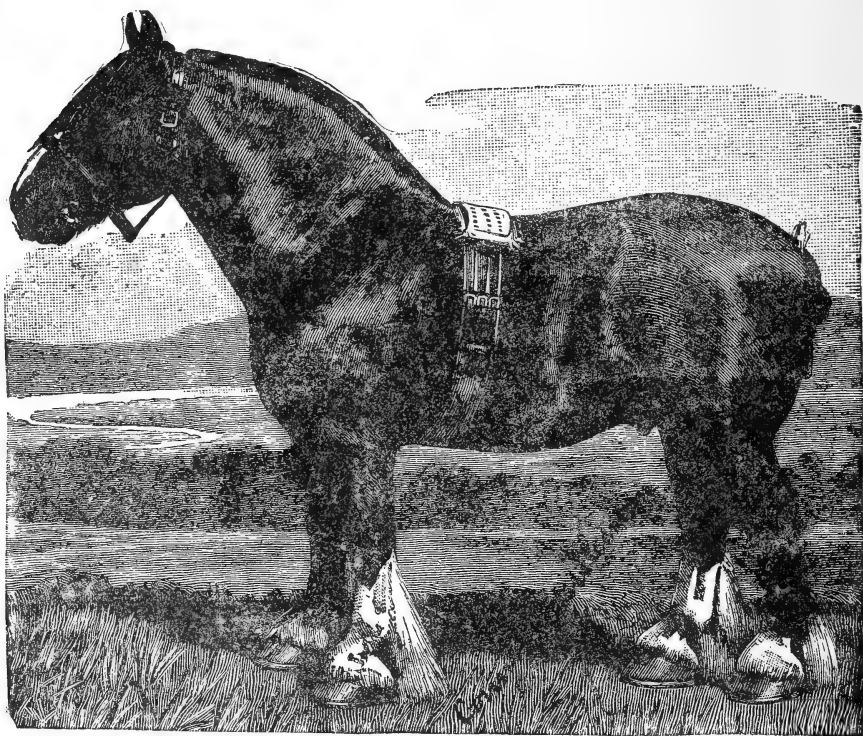
- TINCT-URE.** A solution of medicinal substances in alcohol, usually more or less diluted; spirit containing medicinal substances in solution. Alcoholic solutions of volatile substances are usually called "Spirits."
- TRA-CHE-A.** The windpipe; the passage for the breath from the larynx to the lungs.
- TRE-MOR.** A trembling; a shivering or shaking; a quivering or vibratory motion; as the tremor of a person who is weak, infirm, or old.
- UL-CER.** A sore in any of the soft parts of the body, discharging purulent matter, found on the surface, especially one of the natural surfaces of the body; a sore discharging pus.
- UM-BIL-IC-AL.** The cord which connects the foetus with the placenta, and contains the arteries and veins through which the blood circulates to the young; the naval-string.
- UREA.** A very soluble crystalline substance extracted from the blood by the kidneys and the chief constituent of the urine of mammals.
- U-RE-TER.** The duct that conveys the urine from the kidney to the bladder.
- U-RE-THRA.** The duct that conveys the urine from the bladder to the surface.
- U-TER-US.** The organ of a female mammal in which the young are developed previous to birth; the womb.
- VA-GI-NA.** The canal which leads from the uterus to external orifice of the genital canal or to the cloaca.
- VER-MI-FUGE.** A medicine or substance that expels worms from animal bodies; an anthelmintic.
- VES-I-CA-TING.** Raising little bladders or blisters upon the surface; inflaming and separating the cuticle; blistering.
- VIR-U-LENT.** That which is extremely poisonous or venomous; very active in doing injury.
- VI-RUS.** Contagious or poisonous matter, as of specific ulcers, the bite of snakes, etc. The virus of diseases is now regarded as a microscopic living vegetable organism which multiplies (within the body) and, either by its own action or by the associated development of a chemical poison, causes the disease.
- VIS-CE-RA.** Especially used with reference to the organs contained in the abdomen, or below the diaphragm.

VOL-A-TILE. Substances which affect the smell with pungent or fragrant odors, as musk, hartshorn and essential oils, are called volatile substances, because they waste away on exposure to the atmosphere. Alcohol and ether are called volatile liquids because they easily pass into the state of vapor.

VUL-NER-A-RY. That which is useful in healing wounds; adapted to the cure of external injuries.

VUL-VA. The external parts of the female genital organs; sometimes used to designate the opening between the projecting parts of the external organs.

ZY-MOT-IC. Pertaining to a certain class of endemic, contagious, or sporadic affections which are produced by some organism acting on the system like a ferment.



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